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COAL-MINE FATALITIES IN THE UNITED STATES

1920

AND COAL-MINE STATISTICS SUPPLEMENTING THOSE PUBLISHED IN BULLETIN 115

BY

WILLIAM W. ADAMS

LIST OF PERMISSIBLE EXPLOSIVES, LAMPS AND MOTORS TESTED PRIOR TO JANUARY 31, 1921

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CONTENTS.

Page.
Introduction 7
Acknowledgments 9
Causes of fatalities in 1920, by States and months 10
Details relating to principal causes of fatalities 24
Principal coal-mine disasters 29
Coal production and fatalities, by months, 1920 33
Data essential to determine true accident rates 44
Fatality rates on a 2,000-hour basis 45
Number of 8, 9, and 10 hour employees in coal mines 46
Comparison of fatality rates in the mineral industry 82
Permissible lamps and mining equipment 86
Approved mine-rescue breathing apparatus 86
  Regenerators 88
Permissible lamps and mining equipment approved prior to February 1, 1921 88
  Explosion-proof coal-cutting equipment 88
  Permissible portable electric mine lamps 89
  Permissible miners' (flame) safety lamps 90
  Permissible single-shot blasting unit 91
Permissible explosives tested prior to February 1, 1921 91
  General statement 91
  Definition of a permissible explosive 92
  List of permissible explosives 93
  Classes of permissible explosives 98
    Volume of poisonous gases 98
    Characteristic ingredients 98
  Weight of 1¼ by 8 inch cartridge 100
  Smallest permissible diameter 100
  Percentage strength as determined by the ballistic pendulum 100
  Rate of detonation 100
  Tolerances for permissible explosives 100
  Field samples of permissible explosives 100
State mine inspectors and other mine officials in the United States, January 1, 1921 105
Publications on accident statistics 110
  Publications available for free distribution 110
  Publications that may be obtained only through the Superintendent of Documents 111

TABLES.

Page.

TABLE 1. Coal-mine fatalities, also production statistics, 1907 to 1920, inclusive. 8

2. United States: Fatalities at coal mines for the years ended December 31, 1919 and 1920 8

3. United States: Coal-mine fatalities during the year ended December 31, 1920, by States and causes 10

4. United States: Coal-mine fatalities during the year ended December 31, 1919 and 1920, by causes and months 11

5. United States: Coal-mine fatalities during January, 1920, by causes and States 12

6. United States: Coal-mine fatalities during February, 1920, by causes and States 13

7. United States: Coal-mine fatalities during March, 1920, by causes and States 14

8. United States: Coal-mine fatalities during April, 1920, by causes and States 15

9. United States: Coal-mine fatalities during May, 1920, by causes and States 16

10. United States: Coal-mine fatalities during June, 1920, by causes and States 17

11. United States: Coal-mine fatalities during July, 1920, by causes and States 18

12. United States: Coal-mine fatalities during August, 1920, by causes and States 19

13. United States: Coal-mine fatalities during September, 1920, by causes and States 20

14. United States: Coal-mine fatalities during October, 1920, by causes and States 21

15. United States: Coal-mine fatalities during November, 1920, by causes and States 22

16. United States: Coal-mine fatalities during December, 1920, by causes and States 23

17. United States: Coal-mine fatalities by detailed causes, 1916 to 1920 .. 24

18. United States: Coal-mine fatalities during the year ended December 31, 1920 28

19. Coal-mine disasters in the United States, 1911 to 1920, in which five or more men were killed 29

20. Production, men employed, and number killed in and about the coal mines in the United States during the year ended December 31, 1918 31

21. United States: Coal-mine fatalities during the year ended December 31, 1919 (Revised) 32

22. Coal mine fatalities: Percentages by causes, 1911 to 1920 33

23. Monthly production of anthracite and bituminous coal in the United States, 1913 to 1920 34

24. Coal-mine fatalities by months and years, 1913 to 1920 35

Page.
TABLE 25. United States: Coal-mine fatalities during the years 1914 to 1920, inclusive, by causes and States 36
26. Percentage of coal mined by various methods, by States and years .. 43
27. Men employed, hours worked, and fatality rates at coal mines during the years ended December 31, 1915 and 1916 47
28. Men employed, hours worked, and fatality rates at coal mines during the years ended December 31, 1917 and 1918 48
29. Number of hours to the working day in and about the coal mines, by States and years, 1914 to 1918 49
30. United States: Production of coal during the years ended December 31, 1911 to 1920 52
31. United States: Number of men employed underground during the years ended December 31, 1911 to 1918 53
32. United States: Number of men employed on the surface during the years ended December 31, 1911 to 1918 54
33. United States: Number of men employed underground and on the surface during the years ended December 31, 1911 to 1918 55
34. United States: Number of 300-day workers employed underground during the years ended December 31, 1911 to 1918 56
35. United States: Number of 300-day workers employed on the surface during the years ended December 31, 1911 to 1918 57
36. United States: Number of 300-day workers employed underground and on the surface during the years ended December 31, 1911 to 1918 58
37. United States: Average number of days the coal mines were operated during the years ended December 31, 1911 to 1918 59
38. United States: Number of days of labor performed underground during the years ended December 31, 1911 to 1918 60
39. United States: Number of days of labor performed on the surface during the years ended December 31, 1911 to 1918 61
40. United States: Number of days of labor performed, underground and on the surface, during the years ended December 31, 1911 to 1918 62
41. United States: Number of men killed by underground accidents (including shaft accidents) during the years ended December 31, 1911 to 1918 63
42. United States: Number of men killed by surface accidents during the years ended December 31, 1911 to 1918 64
43. United States: Number of men killed by underground and surface accidents during the years ended December 31, 1911 to 1918 65
44. United States: Number of men killed by underground accidents per 1,000 300-day workers employed underground during the years ended December 31, 1911 to 1918 66
45. United States: Number of men killed by surface accidents per 1,000 300-day workers employed on the surface during the years ended December 31, 1911 to 1918 67
46. United States: Number of men killed by underground and surface accidents per 1,000 300-day workers employed underground and on the surface during the years ended December 31, 1911 to 1918. 68
47. United States: Number of men killed per million tons mined (based on underground and shaft accidents only) during the years ended December 31, 1911 to 1918 69

Page.

TABLE 48. United States: Number of men killed per million tons of coal mined, based on all accidents, during the years ended December 31, 1911 to 1918 70
49. United States: Production per death, based on underground accidents (including shaft accidents) during the years ended December 31, 1911 to 1918 71
50. United States: Production per death based on all accidents during the years ended December 31, 1911 to 1918 72
51. United States: Annual production of coal per man, based on underground employees only, during the years ended December 31, 1911 to 1918 73
52. United States: Annual production of coal per man, based on all employees, during the years ended December 31, 1911 to 1918 74
53. United States: Daily production of coal per man, based on underground employees only, during the years ended December 31, 1911 to 1918 75
54. United States: Daily production of coal per man, based on all employees, during the years ended December 31, 1911 to 1918 76
55. United States: Average value of coal per ton at the mines during the years ended December 31, 1911 to 1918 77
56. United States: Average number of days lost per man by strikes during the years ended December 31, 1911 to 1918 78
57. United States: Number of men on strike at the coal mines during the years ended December 31, 1911 to 1918 79
58. United States: Number of man-days of labor lost by strikes during the years ended December 31, 1911 to 1918 80
59. United States: Percentage of bituminous coal mined by machines during the years ended December 31, 1911 to 1918 81
60. Comparison of fatality rates in the mineral industry in the United States 82
61. United States: Number of men killed per 1,000 300-day workers employed in mineral industries 84
62. United States: Number of men injured per 1,000 300-day workers employed in mineral industries 85

COAL-MINE FATALITIES IN THE UNITED STATES, 1920.

By William W. Adams.

INTRODUCTION.

According to reports received by the United States Bureau of Mines from the various State mine inspectors, 2,260 men were killed by accidents at coal mines during the calendar year 1920, a decrease of 57 fatalities from the record of the year before. This reduction in the number of lives lost is particularly gratifying because it was accompanied by an increase of more than 18 per cent in the output of coal. Preliminary reports of the United States Geological Survey indicate a production of 645,663,000 tons of coal in 1920, of which quantity 556,563,000 tons was bituminous coal and 89,100,000 tons was anthracite. The same reports also estimate the output for 1919 at 546,155,000 tons, including 458,063,000 tons of bituminous coal and 88,092,000 tons of anthracite. Based upon the production, the figures indicate that for every million tons of coal mined 3.50 lives were lost in 1920, as compared with 4.24 in 1919.

Reports are not available to show the number of men engaged in coal mining, either in 1920 or 1919, but estimates from State mine inspectors and from other sources indicate that the number of employees was approximately 775,000 in 1920 and 765,000 in 1919.

Considered by causes, there was a decrease of 64 per cent in fatalities due to mine fires, 38 per cent in fatal accidents caused by explosives, and 14 per cent in deaths resulting from explosions of gas and coal dust. There was also a decrease of 16 per cent in haulage accidents above ground. An increase of 10 per cent is noted in the underground accidents due to electricity, 6 per cent in fatalities caused by underground haulage, and about 2.5 per cent in deaths caused by falls of roof and coal.

The quantity of coal produced for each life lost during the year was approximately 285,700 tons, as compared with 235,700 tons in 1919. In fact, the production per death during the past year was larger than for any other year in the history of coal mining in the United States. Expressed in other words, fewer lives were lost in 1920 in proportion to the output of coal than in any previous year. Next to 1920, the most satisfactory year in this respect was 1916.

Eight disasters in 1920, causing a minimum of five deaths each, resulted in a total of 61 fatalities, as compared with 9 similar accidents in 1919 in which 201 lives were lost. A list of the major disasters since 1911 is given in Table 19.

Table 1 presents a bird's-eye view of the principal data concerning coal-mine fatalities since 1907.

TABLE 1.—*Coal-mine fatalities, also production statistics, 1907 to 1920, inclusive.*

Year.	Average days active. (1)	Men employed. (2)	Men killed. (3)	Killed per 1,000 employed.[a] (4)	Killed per 1,000 300-day workers.[a] (5)	Production per death, short tons. (6)	Average production per man.	
							Per year, tons. (7)	Per day, tons. (8)
1907	231	680, 492	3, 242	4. 76	6. 19	147, 407	708	3. 06
1908	195	690, 438	2, 445	3. 54	5. 45	167, 407	603	3. 09
1909	....	666, 552	2, 642	3. 96	....	174, 416	691	....
1910	220	725, 030	2, 821	3. 89	5. 31	177, 808	692	3. 15
1911	220	728, 348	2, 656	3. 65	4. 97	186, 887	682	3. 10
1912	225	722, 662	2, 419	3. 35	4. 46	220, 945	740	3. 29
1913	238	747, 644	2, 785	3. 73	4. 70	204, 685	762	3. 20
1914	207	763, 185	2, 454	3. 22	4. 66	209, 261	673	3. 25
1915	209	734, 008	2, 269	3. 09	4. 44	234, 297	724	3. 46
1916	235	720, 971	2, 226	3. 09	3. 93	265, 094	818	3. 48
1917	251	757, 317	2, 696	3. 56	4. 25	241, 618	860	3. 43
1918	258	762, 426	2, 580	3. 38	3. 94	262, 873	890	3. 45
1919	....	....	2, 317	....	....	[b] 235, 700	....	....
1920	....	....	2, 260	....	....	[b] 285, 700	....	....

[a] Column 4 gives in the usual way the fatality rate based upon the actual number of employees, regardless of the length of time worked. Column 5 gives a fatality rate based on 1,000 300-day workers. This rate is comparable, one year with another, also one group with another, as the time element has been taken into consideration and all labor equated to a 300-day basis.

[b] Subject to revision.

TABLE 2.—*United States: Fatalities at coal mines for the years ended Dec. 31, 1919 and 1920.*

Cause.	Number killed.		Increase or decrease.	Percentage of increase or decrease.
	1919	1920		
Underground:				
Falls of roof or face	1, 100	1, 127	+27	+ 2. 45
Mine cars and locomotives	381	405	+24	+ 6. 30
Gas and dust explosions	191	164	−27	−14. 14
Explosives	206	127	−79	−38. 35
Electricity	69	76	+ 7	+10. 14
Mine fires	22	8	−14	−63. 64
Miscellaneous underground	108	104	− 4	− 3. 70
Total underground	2, 077	2, 011	−66	− 3. 18
Shaft: Total shaft	53	56	+ 3	+ 5. 66
Surface:				
Haulage	93	78	−15	−16. 13
Machinery	28	28	....	....
Miscellaneous	66	87	+21	+31. 82
Total surface	187	193	+ 6	+ 3. 21
Grand total	**2, 317**	**2, 260**	**−57**	**− 2. 46**

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CAUSES OF FATALITIES IN 1920, BY STATES AND MONTHS.

The causes of fatal accidents at coal mines in 1920, by States and months, are shown in Tables 3 to 16, inclusive.

TABLE 3.—*United States: Coal-mine fatalities during the year ended Dec. 31, 1920, by causes and States.*

State.	Underground.													Shaft.					Surface.							Total by States.	
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Gas explosions and burning gas.	Coal-dust explosions (including gas and dust combined).	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	**Total.**	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip, or bucket.	Other causes.	**Total.**	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes.	Railway cars and locomotives.	Other causes.	**Total.**	1920	1919
Alabama	29	5	14	13	...	6	...	4	...	1	...	...	**72**	...	...	...	...	...	1	...	...	...	1	2	**4**	**76**	**93**
Alaska	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	**0**	**0**
Arkansas	7	...	...	1	...	...	...	...	...	...	...	...	**8**	...	...	...	...	...	...	...	...	...	...	1	**1**	**9**	**10**
California, Idaho, and Nevada	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	**0**	**0**
Colorado	23	11	23	...	...	3	...	5	...	...	...	...	**65**	...	...	1	...	**1**	...	...	1	...	...	3	**4**	**70**	**91**
Georgia and North Carolina	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	**0**	**0**
Illinois	97	1	50	11	4	9	...	15	...	2	1	3	**193**	8	...	2	...	**10**	1	...	...	...	3	...	**4**	**207**	**169**
Indiana	41	...	10	15	7	3	3	3	...	1	...	1	**84**	1	...	2	1	**4**	...	...	...	...	...	...	...	**88**	**83**
Iowa	19	1	3	...	...	...	...	...	...	...	...	...	**23**	1	...	...	...	**1**	...	...	...	...	...	1	**1**	**25**	**17**
Kansas	11	...	1	3	6	2	...	...	...	...	...	...	**23**	1	1	...	...	**2**	...	...	1	...	...	...	**1**	**26**	**25**
Kentucky	67	...	18	2	2	6	...	6	...	3	7	1	**112**	1	...	...	...	**1**	1	1	...	...	2	3	**7**	**120**	**84**
Maryland	7	...	...	...	...	...	...	...	...	...	...	...	**7**	...	...	...	...	...	...	...	...	...	...	...	...	**7**	**5**
Michigan	3	...	1	...	...	...	...	1	...	...	...	...	**5**	...	...	...	...	...	...	...	...	...	...	1	**1**	**6**	**3**
Missouri	6	...	2	...	...	1	...	...	...	...	...	...	**9**	...	...	...	1	**1**	...	...	...	...	...	1	**1**	**11**	**10**
Montana	6	1	4	...	...	1	...	1	...	1	...	...	**14**	...	...	...	...	...	...	...	...	...	...	...	...	**14**	**11**
New Mexico	10	7	4	...	5	1	...	3	...	...	...	1	**31**	...	...	...	...	...	2	...	...	...	...	...	**2**	**33**	**25**
North Dakota	1	...	...	...	1	...	...	1	...	...	...	...	**3**	...	...	...	...	...	...	...	...	...	...	...	...	**3**	**4**
Ohio	78	1	25	3	...	9	3	2	...	4	...	2	**127**	1	...	...	...	**1**	1	...	...	...	2	3	**6**	**134**	**142**
Oklahoma	7	1	4	17	3	2	...	6	...	...	...	...	**40**	...	...	...	...	...	1	...	...	...	...	...	**1**	**41**	**36**
Oregon	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	**0**	**0**
Pennsylvania (bituminous)	207	27	79	22	...	22	1	9	...	10	...	7	**384**	2	6	1	...	**9**	7	3	2	3	7	12	**34**	**427**	**399**
South Dakota	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	**0**	**0**
Tennessee	13	3	4	1	...	...	...	...	...	...	...	...	**21**	...	...	...	...	...	...	...	...	...	...	...	...	**21**	**27**
Texas	3	...	...	...	...	1	...	...	...	...	...	...	**4**	...	...	1	...	**1**	...	...	...	...	...	...	...	**5**	**3**
Utah	11	8	9	...	...	...	1	...	...	1	...	...	**30**	...	...	...	...	...	1	3	...	...	...	...	**4**	**34**	**27**
Virginia	5	6	8	3	1	...	...	...	...	...	...	2	**25**	...	...	...	...	...	...	...	1	...	...	...	**1**	**26**	**34**
Washington	7	1	5	...	...	...	...	...	...	...	...	3	**16**	...	...	...	...	...	1	1	...	...	...	...	**2**	**18**	**19**
West Virginia	165	15	66	3	5	12	...	12	...	11	...	...	**289**	1	1	...	...	**2**	15	6	...	...	6	5	**32**	**323**	**332**
Wyoming	16	5	10	...	...	...	...	2	...	2	...	...	**35**	...	...	1	...	**1**	1	1	...	...	...	11	**13**	**49**	**33**
Total (bituminous)	**839**	**93**	**340**	**94**	**34**	**78**	**8**	**70**	...	**36**	**8**	**20**	**1,620**	**16**	**8**	**8**	**2**	**34**	**32**	**15**	**5**	**3**	**21**	**43**	**119**	**1,773**	**1,682**
Pennsylvania (anthracite)	160	35	65	36	...	49	10	6	4	1	...	25	**391**	11	...	11	...	**22**	22	2	19	1	3	27	**74**	**487**	**635**
Total, 1920	**999**	**128**	**405**	**130**	**34**	**127**	**18**	**76**	**4**	**37**	**8**	**45**	**2,011**	**27**	**8**	**19**	**2**	**56**	**54**	**17**	**24**	**4**	**24**	**70**	**193**	**2,260**	......
Total, 1919	946	154	381	144	47	206	11	69	2	26	22	69	**2,077**	20	6	21	6	**53**	71	10	22	6	22	56	**187**	......	**2,317**

TABLE 4.—*United States: Coal-mine fatalities during the year ended Dec. 31, 1919 and 1920, by causes and months.*

Month.	Underground.													Shaft.					Surface.							Grand total.
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Gas explosions and burning gas.	Coal-dust explosions (including gas and dust combined).	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	Total.	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip, or bucket.	Other causes.	Total.	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes.	Railway cars and locomotives.	Other causes.	Total.	
													1919.													
January	61	17	42	7	1	15	1	4	....	1	2	4	155	2	......	1	....	3	9	....	4	1	2	9	25	183
February	75	7	35	13	2	4	....	3	....	3	....	3	145	3	3	....	....	6	3	1	3	......	1	1	9	160
March	81	14	26	18	3	5	2	2	....	1	....	5	157	....	......	1	....	1	8	....	1	......	3	1	13	171
April	82	11	33	5	23	6	1	2	....	2	....	6	171	1	......	2	....	3	8	....	2	2	1	2	15	189
May	86	8	34	.....	7	15	....	5	1	2	....	9	167	1	......	5	....	6	1	3	1	......	3	4	12	185
June	87	13	31	25	......	98	2	6	1	2	....	6	271	1	2	....	2	5	5	1	2	1	1	9	19	295
July	93	11	34	19	......	14	2	14	....	2	....	8	197	3	......	3	....	6	10	2	....	......	....	7	19	222
August	89	18	35	31	......	12	1	7	....	6	....	6	205	6	......	....	....	6	3	1	....	......	3	5	12	223
September	77	16	31	4	......	9	1	10	....	2	....	7	157	2	......	2	....	4	8	....	3	1	1	5	18	179
October	99	16	37	12	......	13	1	10	....	3	20	5	216	1	1	6	....	8	8	2	3	......	2	5	20	244
November	46	8	18	6	......	6	....	2	....	1	....	2	89	....	......	....	....	....	2	....	1	......	2	1	6	95
December	70	15	25	4	11	9	....	4	....	1	....	8	147	....	......	1	4	5	6	....	2	1	3	7	19	171
Total, 1919	**946**	**154**	**381**	**144**	**47**	**206**	**11**	**69**	**2**	**26**	**22**	**69**	**2,077**	**20**	**6**	**21**	**6**	**53**	**71**	**10**	**22**	**6**	**22**	**56**	**187**	**2,317**
													1920.													
January	74	17	35	12	5	16	....	11	....	8	1	4	183	3	1	5	....	9	5	1	3	......	3	4	16	208
February	68	8	28	6	4	11	2	4	....	3	....	1	135	7	......	1	....	8	6	2	2	......	1	6	17	160
March	80	8	33	7	1	8	1	5	2	3	....	9	157	1	......	1	....	2	9	1	2	......	3	7	22	181
April	75	5	37	7	5	13	1	3	....	....	....	2	148	....	......	2	....	2	5	1	2	......	1	3	12	162
May	60	11	36	10	2	7	2	5	....	3	....	2	138	4	......	4	....	8	5	2	4	......	2	4	17	163
June	106	15	22	28	3	10	3	8	....	5	....	2	202	4	1	....	....	5	3	1	1	1	1	5	12	219
July	88	12	31	12	......	10	....	7	....	3	....	7	170	....	......	2	....	2	2	3	1	1	2	12	21	193
August	88	11	38	14	......	5	1	10	2	....	....	4	173	....	6	1	1	8	5	3	1	1	6	6	22	203
September	98	8	35	10	......	17	1	10	....	3	....	2	184	1	......	....	....	1	3	1	1	......	....	7	12	197
October	90	15	41	6	4	8	4	6	....	2	....	3	179	2	......	1	....	3	4	2	2	......	1	3	12	194
November	85	10	34	14	2	11	3	5	....	4	7	4	179	2	......	2	1	5	3	....	1	1	3	5	13	197
December	87	8	35	4	8	11	....	2	....	3	....	5	163	3	......	....	....	3	4	....	4	......	1	8	17	183
Total, 1920	**999**	**128**	**405**	**130**	**34**	**127**	**18**	**76**	**4**	**37**	**8**	**45**	**2,011**	**27**	**8**	**19**	**2**	**56**	**54**	**17**	**24**	**4**	**24**	**70**	**193**	**2,260**

TABLE 5.—*United States: Coal-mine fatalities during* **January,** *1920, by causes and States.*

State.	Underground.													Shaft.					Surface.							Total by States.	
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Gas explosions and burning gas.	Coal-dust explosions (including gas and dust combined).	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	**Total.**	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip, or bucket.	Other causes.	**Total.**	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes.	Railway cars and locomotives.	Other causes.	**Total.**	**1920.**	1919.
Alabama	1							1					**2**													**2**	7
Alaska																										**0**	0
Arkansas	1			1									**2**													**2**	2
California, Idaho, and Nevada																										**0**	0
Colorado	3	4	1					1					**9**											1	**1**	**10**	7
Georgia and North Carolina																										**0**	0
Illinois	3		4	1		4		1			1		**14**			1		**1**								**15**	11
Indiana	4				3	2							**9**													**9**	3
Iowa	2												**2**													**2**	1
Kansas	2				2	1							**5**													**5**	3
Kentucky	5		3			1						1	**10**										1		**1**	**11**	3
Maryland																										**0**	2
Michigan																										**0**	1
Missouri	1												**1**													**1**	1
Montana			1										**1**													**1**	1
New Mexico								1					**1**						1						**1**	**2**	3
North Dakota																										**0**	0
Ohio	3		1							1			**5**													**5**	9
Oklahoma			1					4					**5**													**5**	1
Oregon																										**0**	0
Pennsylvania (bituminous)	19	3	9	1		3		2		4		1	**42**										1		**1**	**43**	42
South Dakota																										**0**	0
Tennessee			1										**1**													**1**	4
Texas																										**0**	0
Utah	1		1							1			**3**													**3**	4
Virginia	1		2	2								1	**6**													**6**	1
Washington	1		2										**3**													**3**	2
West Virginia	12	4	6	2				1		2			**27**		1			**1**	1	1				1	**3**	**31**	28
Wyoming	1	3											**4**													**4**	3
Total (bituminous)	**60**	**14**	**32**	**7**	**5**	**11**		**11**		**8**	**1**	**3**	**152**		**1**	**1**		**2**	**2**	**1**			**2**	**2**	**7**	**161**	**139**
Pennsylvania (anthracite)	14	3	3	5		5						1	**31**	3		4		**7**	3		3		1	2	**9**	**47**	**44**
Total, January, 1920	**74**	**17**	**35**	**12**	**5**	**16**		**11**		**8**	**1**	**4**	**183**	**3**	**1**	**5**		**9**	**5**	**1**	**3**		**3**	**4**	**16**	**208**	
Total, January, 1919	61	17	42	7	1	15	1	4		1	2	4	**155**	2		1		**3**	9		4	1	2	9	**25**		183

Table 6.—*United States: Coal-mine fatalities during* ***February,*** *1920, by causes and States.*

State.	Underground.													Shaft.					Surface.							Total by States.	
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Gas explosions and burning gas.	Coal-dust explosions (including gas and dust combined).	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	Total.	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip, or bucket.	Other causes.	Total.	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes.	Railway cars and locomotives.	Other causes.	Total.	1920.	1919.
Alabama						1							1											1	1	2	9
Alaska																										0	0
Arkansas	1												1													1	1
California, Idaho, and Nevada																										0	0
Colorado	3		1			1							5								1				1	6	3
Georgia and North Carolina																										0	0
Illinois	7		2			1		1					11	6				6								17	11
Indiana	5		1										6													6	9
Iowa	1		1										2													2	2
Kansas																					1				1	1	2
Kentucky	4			1				1		1			7													7	7
Maryland	1												1													1	0
Michigan																										0	0
Missouri																										0	0
Montana																										0	3
New Mexico		1											1													1	1
North Dakota					1								1													1	0
Ohio	8		1							1			10													10	12
Oklahoma						1							1													1	0
Oregon																										0	0
Pennsylvania (bituminous)	16	1	5			1		1		1			25			1		1	2	1			1	1	5	31	22
South Dakota																										0	0
Tennessee				1									1													1	2
Texas																										0	0
Utah	1	2	2										5							1					1	6	2
Virginia			2	1									3													3	5
Washington			1										1													1	2
West Virginia	8		3		3	1		1					16						3					1	4	20	33
Wyoming	2		1										3													3	3
Total (bituminous)	57	4	20	3	4	6		4		3			101	6		1		7	5	2	2		1	3	13	121	129
Pennsylvania (anthracite)	11	4	8	3		5	2					1	34	1				1	1					3	4	39	31
Total, February, 1920	68	8	28	6	4	11	2	4		3		1	135	7		1		8	6	2	2		1	6	17	160	
Total, February, 1919	75	7	35	13	2	4		3		3		3	145	3	3			6	3	1	3		1	1	9		160

TABLE 7.—*United States: Coal-mine fatalities during* **March,** *1920, by causes and States.*

State.	Underground.													Shaft.					Surface.							Total by States.	
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Gas explosions and burning gas.	Coal-dust explosions (including gas and dust combined).	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	**Total.**	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip, or bucket.	Other causes.	**Total.**	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes.	Railway cars and locomotives.	Other causes.	**Total.**	1920	1919
Alabama	3	....	5	1	....	....	....	....	....	....	....	....	**9**	....	....	....	....	....	....	....	....	....	....	....	....	**9**	7
Alaska	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	**0**	0
Arkansas	1	....	....	....	....	....	....	....	....	....	....	....	**1**	....	....	....	....	....	....	....	....	....	....	....	....	**1**	1
California, Idaho, and Nevada	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	**0**	0
Colorado	1	2	1	....	....	....	....	....	....	....	....	....	**4**	....	....	....	....	....	....	....	....	....	....	1	**1**	**5**	19
Georgia and North Carolina	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	**0**	0
Illinois	7	....	3	3	....	....	....	1	....	....	....	3	**17**	....	....	....	....	....	....	....	....	....	1	....	**1**	**18**	18
Indiana	4	....	....	....	....	....	....	....	....	....	....	....	**4**	....	....	....	....	....	....	....	....	....	....	....	....	**4**	8
Iowa	2	....	....	....	....	....	....	....	....	....	....	....	**2**	....	....	....	....	....	....	....	....	....	....	....	....	**2**	1
Kansas	1	....	....	....	....	....	....	....	....	....	....	....	**1**	....	....	....	....	....	....	....	....	....	....	....	....	**1**	3
Kentucky	4	....	1	....	....	1	....	1	....	....	....	....	**7**	....	....	....	....	....	....	....	....	....	....	....	....	**7**	6
Maryland	1	....	....	....	....	....	....	....	....	....	....	....	**1**	....	....	....	....	....	....	....	....	....	....	....	....	**1**	0
Michigan	....	....	1	....	....	....	....	1	....	....	....	....	**2**	....	....	....	....	....	....	....	....	....	....	....	....	**2**	2
Missouri	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	**0**	0
Montana	1	....	....	....	....	....	....	....	....	....	....	....	**1**	....	....	....	....	....	....	....	....	....	....	....	....	**1**	0
New Mexico	3	1	....	....	....	1	....	....	....	....	....	....	**5**	....	....	....	....	....	....	....	....	....	....	....	....	**5**	2
North Dakota	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	**0**	1
Ohio	6	....	3	....	....	1	....	1	....	....	....	1	**12**	....	....	....	....	....	....	....	....	....	....	1	**1**	**13**	6
Oklahoma	1	....	....	....	....	....	....	....	....	....	....	....	**1**	....	....	....	....	....	1	....	....	....	....	....	**1**	**2**	1
Oregon	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	**0**	0
Pennsylvania (bituminous)	13	2	5	....	....	2	....	....	....	1	....	1	**24**	....	....	....	....	....	1	1	....	....	1	2	**5**	**29**	33
South Dakota	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	**0**	0
Tennessee	3	....	....	....	....	....	....	....	....	....	....	....	**3**	....	....	....	....	....	....	....	....	....	....	....	....	**3**	4
Texas	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	**0**	0
Utah	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	**0**	2
Virginia	....	....	....	....	1	....	....	....	....	....	....	1	**2**	....	....	....	....	....	....	....	....	....	....	....	....	**2**	1
Washington	....	1	....	....	....	....	....	....	....	....	....	....	**1**	....	....	....	....	....	....	....	....	....	....	....	....	**1**	2
West Virginia	16	....	3	....	....	....	....	....	....	1	....	....	**20**	....	....	....	....	....	3	....	....	....	1	....	**4**	**24**	20
Wyoming	....	....	1	....	....	....	....	1	....	1	....	....	**3**	....	....	....	....	....	....	....	....	....	....	....	....	**3**	1
Total (bituminous)	**67**	**6**	**23**	**4**	**1**	**5**	....	**5**	....	**3**	....	**6**	**120**	....	....	....	....	....	**5**	**1**	....	....	**3**	**4**	**13**	**133**	138
Pennsylvania (anthracite)	13	2	10	3	....	3	1	....	2	....	....	3	**37**	1	....	1	....	**2**	4	....	2	....	....	3	**9**	**48**	33
Total, March, 1920	**80**	**8**	**33**	**7**	**1**	**8**	**1**	**5**	**2**	**3**	....	**9**	**157**	**1**	....	**1**	....	**2**	**9**	**1**	**2**	....	**3**	**7**	**22**	**181**	....
Total, March, 1919	81	14	26	18	3	5	2	2	....	1	....	5	**157**	....	....	1	....	**1**	8	....	1	....	3	1	**13**	....	171

TABLE 8.—*United States: Coal-mine fatalities during* **April,** *1920, by causes and States.*

State.	Underground.													Shaft.					Surface.							Total by States.	
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Gas explosions and burning gas.	Coal-dust explosions (including gas and dust combined).	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	**Total.**	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip, or bucket.	Other causes.	**Total.**	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes.	Railway cars and locomotives.	Other causes.	**Total.**	**1920**	1919
Alabama	4		1										**5**													**5**	31
Alaska																										**0**	0
Arkansas																										**0**	0
California, Idaho, and Nevada																										**0**	0
Colorado	2	1	1										**4**													**4**	6
Georgia and North Carolina																										**0**	0
Illinois	2	1	4			1		1					**9**													**9**	11
Indiana	3			1									**4**			2		**2**								**6**	5
Iowa	1		1										**2**													**2**	3
Kansas	1												**1**													**1**	3
Kentucky	4		2	1									**7**													**7**	6
Maryland																										**0**	0
Michigan																								1	1	**1**	0
Missouri	2												**2**													**2**	2
Montana	1					1							**2**													**2**	1
New Mexico	3		3		5			1					**12**													**12**	0
North Dakota																										**0**	0
Ohio	10		2			1		1					**14**													**14**	7
Oklahoma			1	3									**4**													**4**	2
Oregon																										**0**	0
Pennsylvania (bituminous)	17		7	1		1						1	**27**						2		1			1	**4**	**31**	38
South Dakota																										**0**	0
Tennessee																										**0**	2
Texas	1												**1**													**1**	0
Utah																										**0**	1
Virginia			1										**1**													**1**	2
Washington																										**0**	2
West Virginia	11		7			1							**19**							1			1		2	**21**	16
Wyoming	1		3										**4**													**4**	3
Total (bituminous)	**63**	**2**	**33**	**6**	**5**	**5**		**3**				**1**	**118**			**2**		**2**	**2**	**1**	**1**		**1**	**2**	**7**	**127**	**141**
Pennsylvania (anthracite)	12	3	4	1		8	1					1	30						3		1			1	5	**35**	48
Total, April, 1920	75	5	37	7	5	13	1	3				2	148			2		2	5	1	2		1	3	12	**162**	
Total, April, 1919	82	11	33	5	23	6	1	2		2		6	171	1		2		3	8		2	2	1	2	15		189

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TABLE 9.—*United States: Coal-mine fatalities during* **May**, *1920, by causes and States.*

State.	Underground.													Shaft.					Surface.							Total by States.	
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Gas explosions and burning gas.	Coal-dust explosions (including gas and dust combined).	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	Total.	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip, or bucket.	Other causes.	Total.	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes.	Railway cars and locomotives.	Other causes.	Total.	1920	1919
Alabama	3		3							1			7													7	6
Alaska																										0	0
Arkansas																										0	1
California, Idaho, and Nevada																										0	0
Colorado	1		5										6			1		1								7	2
Georgia and North Carolina																										0	0
Illinois	2		1	2				3		1			9						1						1	10	17
Indiana			3	5	1								9													9	7
Iowa	2												2	1				1								3	1
Kansas					1								1													1	3
Kentucky	3		3					1					7													7	14
Maryland	1												1													1	1
Michigan	2												2													2	0
Missouri			1										1													1	0
Montana	1							1					2													2	1
New Mexico																										0	2
North Dakota																										0	1
Ohio	1		1										2										1		1	3	10
Oklahoma						1							1													1	3
Oregon																										0	0
Pennsylvania (bituminous)	11	3	6			1	1						22										1	1	2	24	35
South Dakota																										0	0
Tennessee	1		1										2													2	1
Texas	1												1													1	0
Utah	1						1						2													2	0
Virginia			2										2													2	3
Washington			1										1							1					1	2	4
West Virginia	11	1	5			1				1			19	1				1						1	1	21	26
Wyoming	1	1											2											1	1	3	3
Total (bituminous)	42	5	32	7	2	3	2	5		3			101	2		1		3	1	1			2	3	7	111	141
Pennsylvania (anthracite)	18	6	4	3		4						2	37	2		3		5	4	1	4			1	10	52	44
Total, May, 1920	60	11	36	10	2	7	2	5		3		2	138	4		4		8	5	2	4		2	4	17	163	
Total, May, 1919	86	8	34		7	15		5	1	2		9	167	1		5		6	1	3	1		3	4	12		185

TABLE 10.—*United States: Coal-mine fatalities during* **June**, *1920, by causes and States.*

State.	Underground.													Shaft.					Surface.							Total by States.	
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Gas explosions and burning gas.	Coal-dust explosions (including gas and dust combined).	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	Total.	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip, or bucket.	Other causes.	Total.	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes.	Railway cars and locomotives.	Other causes.	Total.	1920	1919
Alabama		3				3							6													6	4
Alaska																										0	0
Arkansas																										0	0
California, Idaho, and Nevada																										0	0
Colorado	6	1											7													7	5
Georgia and North Carolina																										0	0
Illinois	12		4	3	3			1					23	1				1								24	16
Indiana	1		1	2			1						5													5	4
Iowa		1											1													1	0
Kansas				1									1	1	1			2								3	2
Kentucky	7		2					1		1			11	1				1					1		1	13	8
Maryland																										0	0
Michigan																										0	0
Missouri																										0	0
Montana																										0	0
New Mexico	1	2	1									1	5													5	8
North Dakota																										0	0
Ohio	10		1	1		1				1			14													14	15
Oklahoma	1		1	2				2					6													6	17
Oregon																										0	0
Pennsylvania (bituminous)	24	4	6	10		1		1		2			48						1			1		2	4	52	28
South Dakota																										0	0
Tennessee	1	1											2													2	3
Texas																										0	1
Utah	1												1							1					1	2	2
Virginia	1												1													1	2
Washington																										0	0
West Virginia	16		4					3					23						1						1	24	33
Wyoming	3									1			4													4	3
Total (bituminous)	**84**	**12**	**20**	**19**	**3**	**5**	**1**	**8**		**5**		**1**	**158**	**3**	**1**			**4**	**2**	**1**		**1**	**1**	**2**	**7**	**169**	**151**
Pennsylvania (anthracite)	22	3	2	9		5	2					1	44	1				1	1		1			3	5	50	144
Total, June, 1920	**106**	**15**	**22**	**28**	**3**	**10**	**3**	**8**		**5**		**2**	**202**	**4**	**1**			**5**	**3**	**1**	**1**	**1**	**1**	**5**	**12**	**219**	
Total, June, 1919	87	13	31	25		98	2	6	1	2		6	271	1	2		2	5	5	1	2	1	1	9	19		295

TABLE 11.—*United States: Coal-mine fatalities during* **July**, *1920, by causes and States.*

State.	Underground.													Shaft.					Surface.							Total by States.	
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Gas explosions and burning gas.	Coal-dust explosions (including gas and dust combined).	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	Total.	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip, or bucket.	Other causes.	Total.	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes.	Railway cars and locomotives.	Other causes.	Total.	1920	1919
Alabama	1	2						1					4													4	3
Alaska																										0	0
Arkansas	1												1													1	1
California, Idaho, and Nevada																										0	0
Colorado	1		3			1							5													5	3
Georgia and North Carolina																										0	0
Illinois	5		3			1		2					11													11	12
Indiana	2			1									3													3	3
Iowa	1												1													1	4
Kansas	2												2													2	2
Kentucky	7												7													7	10
Maryland	2												2													2	0
Michigan	1												1													1	0
Missouri	1		1										2													2	1
Montana	1												1													1	1
New Mexico								1					1						1						1	2	4
North Dakota																										0	0
Ohio	9		2										11										1		1	12	10
Oklahoma																										0	4
Oregon																										0	0
Pennsylvania (bituminous)	18	1	4	9		6		1					39								1	1			2	41	32
South Dakota																										0	0
Tennessee	1												1													1	3
Texas	1												1													1	0
Utah	1	1	1										3													3	3
Virginia		3											3													3	7
Washington	1											3	4													4	1
West Virginia	12	1	10					1		3			27						1	2					3	30	46
Wyoming	1		3										4											8	8	12	4
Total (bituminous)	69	8	27	10		8		6		3		3	134						2	2	1	1	1	8	15	149	154
Pennsylvania (anthracite)	19	4	4	2		2		1				4	36			2		2		1			1	4	6	44	68
Total, July, 1920	88	12	31	12		10		7		3		7	170			2		2	2	3	1	1	2	12	21	193	
Total, July, 1919	93	11	34	19		14	2	14		2		8	197	3		3		6	10	2				7	19		222

TABLE 12.—*United States: Coal-mine fatalities during* **August,** *1920, by causes and States.*

State.	Underground.													Shaft.					Surface.							Total by States.	
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Gas explosions and burning gas.	Coal-dust explosions (including gas and dust combined).	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	**Total.**	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip, or bucket.	Other causes.	**Total.**	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes.	Railway cars and locomotives.	Other causes.	**Total.**	1920	1919
Alabama	1		1										**2**													**2**	5
Alaska																										**0**	0
Arkansas																										**0**	3
California, Idaho, and Nevada																										**0**	0
Colorado	1												**1**													**1**	23
Georgia and North Carolina																										**0**	0
Illinois	11		7	1		1		2					**22**										2		2	**24**	16
Indiana	2		3					1					**6**				1	**1**								**7**	11
Iowa	4												**4**													**4**	2
Kansas																										**0**	2
Kentucky	4		1			1							**6**						1	1				3	5	**11**	1
Maryland																										**0**	0
Michigan																										**0**	0
Missouri																										**0**	4
Montana																										**0**	1
New Mexico																										**0**	1
North Dakota																										**0**	0
Ohio	6		3	2									**11**													**11**	13
Oklahoma	2			10									**12**													**12**	1
Oregon																										**0**	0
Pennsylvania (bituminous)	20	4	7					1				1	**33**		6			**6**		1			2		3	**42**	53
South Dakota																										**0**	0
Tennessee	2												**2**													**2**	2
Texas																1		**1**								**1**	0
Utah		2	1										**3**						1						1	**4**	3
Virginia	1		1										**2**													**2**	0
Washington																			1						1	**1**	1
West Virginia	19	2	6					3					**30**						1	1			2		4	**34**	36
Wyoming	1												**1**						1					1	2	**3**	2
Total (bituminous)	**74**	**8**	**30**	**13**		**2**		**7**				**1**	135		**6**	**1**	**1**	**8**	**5**	**3**			**6**	**4**	18	**161**	**180**
Pennsylvania (anthracite)	14	3	8	1		3	1	3	2			3	38								1	1		2	**4**	**42**	43
Total, August, 1920	**88**	**11**	**38**	**14**		**5**	**1**	**10**	**2**			**4**	173		**6**	**1**	**1**	**8**	**5**	**3**	**1**	**1**	**6**	**6**	22	**203**	
Total, August, 1919	89	18	35	31		12	1	7		6		6	205	6				**6**	3	1			3	5	12		**223**

TABLE 13.—*United States: Coal-mine fatalities during* **September**, *1920, by causes and States.*

State.	Underground.													Shaft.					Surface.							Total by States.	
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Gas explosions and burning gas.	Coal-dust explosions (including gas and dust combined).	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	Total.	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip, or bucket.	Other causes.	Total.	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes.	Railway cars and locomotives.	Other causes.	Total.	1920	1919
Alabama	4		2			2							8						1						1	9	4
Alaska																										0	0
Arkansas																										0	0
California, Idaho, and Nevada																										0	0
Colorado	1	2	3					1					7													7	4
Georgia and North Carolina																										0	0
Illinois	11		6										17													17	27
Indiana	8			3				2		1		1	15													15	9
Iowa	3												3													3	1
Kansas				2									2													2	2
Kentucky	11					1		2					14													14	9
Maryland	1												1													1	1
Michigan																										0	0
Missouri																										0	1
Montana			1										1													1	2
New Mexico	1	3											4													4	1
North Dakota																										0	1
Ohio	9		5			1	1						16											2	2	18	10
Oklahoma	1		1	1									3													3	1
Oregon																										0	0
Pennsylvania (bituminous)	26	2	7			5		1				1	42	1				1						2	2	45	27
South Dakota																										0	0
Tennessee	1												1													1	1
Texas						1							1													1	0
Utah	1		1										2							1					1	3	2
Virginia																										0	0
Washington			1										1													1	2
West Virginia	14	1	6	1		3		2		2			29						2						2	31	31
Wyoming								1					1													1	2
Total (bituminous)	**92**	**8**	**33**	**7**		**13**	**1**	**9**		**3**		**2**	**168**	**1**				**1**	**3**	**1**				**4**	**8**	**177**	**138**
Pennsylvania (anthracite)	6		2	3		4		1					16								1			3	4	20	41
Total, September, 1920	**98**	**8**	**35**	**10**		**17**	**1**	**10**		**3**		**2**	**184**	**1**				**1**	**3**	**1**	**1**			**7**	**12**	**197**	
Total, September, 1919	**77**	**16**	**31**	**4**		**9**	**1**	**10**		**2**		**7**	**157**	**2**		**2**		**4**	**8**		**3**	**1**	**1**	**5**	**18**		**179**

TABLE 14.—*United States: Coal-mine fatalities during* **October,** *1920, by causes and States.*

State.	Underground.													Shaft.					Surface.							Total by States.	
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Gas explosions and burning gas.	Coal-dust explosions (including gas and dust combined).	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	**Total.**	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip, or bucket.	Other causes.	**Total.**	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes.	Railway cars and locomotives.	Other causes.	**Total.**	**1920**	1919
Alabama	3		1										**4**											1	**1**	**5**	7
Alaska																										**0**	0
Arkansas	1												**1**													**1**	0
California, Idaho, and Nevada																										**0**	0
Colorado	1		1			1		1					**4**													**4**	12
Georgia and North Carolina																										**0**	0
Illinois	18		7					3					**28**			1		**1**								**29**	21
Indiana	6		1	3			2						**12**													**12**	8
Iowa	1		1										**2**													**2**	0
Kansas	1		1										**2**													**2**	2
Kentucky	9		3		2								**14**													**14**	11
Maryland	1												**1**													**1**	1
Michigan																										**0**	0
Missouri																										**0**	1
Montana		1											**1**													**1**	0
New Mexico																										**0**	1
North Dakota																										**0**	0
Ohio	7	1				2				1			**11**	1				**1**								**12**	43
Oklahoma		1		1									**2**													**2**	2
Oregon																										**0**	0
Pennsylvania (bituminous)	11	2	11			1				1		1	**27**						1					1	**2**	**29**	45
South Dakota																										**0**	0
Tennessee	1												**1**													**1**	2
Texas																										**0**	2
Utah	3	2	1										**6**													**6**	4
Virginia		3											**3**													**3**	2
Washington																										**0**	2
West Virginia	16	2	6		2	1		1					**28**						2	1			1	1	**5**	**33**	24
Wyoming	1												**1**							1					**1**	**2**	5
Total (bituminous)	**80**	**12**	**33**	**4**	**4**	**5**	**2**	**5**		**2**		**1**	**148**	**1**		**1**		**2**	**3**	**2**			**1**	**3**	**9**	**159**	**195**
Pennsylvania (anthracite)	10	3	8	2		3	2	1				2	**31**	1				**1**	1		2				**3**	**35**	49
Total, October, 1920	**90**	**15**	**41**	**6**	**4**	**8**	**4**	**6**		**2**		**3**	**179**	**2**		**1**		**3**	**4**	**2**	**2**		**1**	**3**	**12**	**194**	
Total, October, 1919	**99**	**16**	**37**	**12**		**13**	**1**	**10**		**3**	**20**	**5**	**216**	**1**	**1**	**6**		**8**	**8**	**2**	**3**		**2**	**5**	**20**		**244**

TABLE 15.—*United States: Coal-mine fatalities during* **November**, *1920, by causes and States.*

State.	Underground.													Shaft.					Surface.							Total by States.	
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Gas explosions and burning gas.	Coal-dust explosions (including gas and dust combined).	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	Total.	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip, or bucket.	Other causes.	Total.	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes.	Railway cars and locomotives.	Other causes.	Total.	1920	1919
Alabama	3		1	12				2					18										1		1	19	6
Alaska																										0	0
Arkansas	1												1											1	1	2	0
California, Idaho, and Nevada																										0	0
Colorado			5					1					6											1	1	7	0
Georgia and North Carolina																										0	0
Illinois	10		5	1	1	1							18													18	3
Indiana	4		1			1							6													6	1
Iowa	1												1													1	0
Kansas	4					1							5													5	0
Kentucky	7		2			2					7		18													18	4
Maryland																										0	0
Michigan																										0	0
Missouri	1					1							2				1	1						1	1	4	0
Montana										1			1													1	0
New Mexico	2												2													2	0
North Dakota	1							1					2													2	1
Ohio	4		3				2					1	10						1						1	11	2
Oklahoma	2				1								3													3	0
Oregon																										0	0
Pennsylvania (bituminous)	16	4	4					1					25	1				1				1	1	1	3	29	17
South Dakota																										0	0
Tennessee	3	2											5													5	0
Texas																										0	0
Utah			1										1													1	2
Virginia	2												2													2	5
Washington																										0	0
West Virginia	13	2	5			3				2			25						1						1	26	15
Wyoming	3		1										4			1		1								5	3
Total (bituminous)	77	8	28	13	2	9	2	5	....	3	7	1	155	1	......	1	1	3	2	....	....	1	2	4	9	167	59
Pennsylvania (anthracite)	8	2	6	1	......	2	1	....	....	1	....	3	24	1	......	1	....	2	1	....	1	......	1	1	4	30	36
Total, November, 1920	85	10	34	14	2	11	3	5	....	4	7	4	179	2	......	2	1	5	3	....	1	1	3	5	13	197	......
Total, November, 1919	46	8	18	6	......	6	....	2	....	1	....	2	89	....	......	....	....	....	2	....	1	......	2	1	6	......	95

TABLE 16.—*United States: Coal-mine fatalities during* **December**, *1920, by causes and States.*

State.	Underground.													Shaft.					Surface.							Total by States.	
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Gas explosions and burning gas.	Coal-dust explosions (including gas and dust combined).	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	Total.	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip, or bucket.	Other causes.	Total.	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes.	Railway cars and locomotives.	Other causes.	Total.	1920	1919
Alabama	6												6													6	4
Alaska																										0	0
Arkansas	1												1													1	1
California, Idaho, and Nevada																										0	0
Colorado	3	1	2					1					7													7	7
Georgia and North Carolina																										0	0
Illinois	9		4							1			14	1				1								15	6
Indiana	2				3								5	1				1								6	15
Iowa	1												1											1	1	2	2
Kansas					3								3													3	1
Kentucky	2		1							1			4													4	5
Maryland																										0	0
Michigan																										0	0
Missouri	1												1													1	0
Montana	2		2										4													4	1
New Mexico																										0	2
North Dakota																										0	0
Ohio	5		3			3							11													11	5
Oklahoma					2								2													2	4
Oregon																										0	0
Pennsylvania (bituminous)	16	1	8	1		1		1		1		1	30											1	1	31	27
South Dakota																										0	0
Tennessee			2										2													2	3
Texas																										0	0
Utah	2	1	1										4													4	2
Virginia																					1				1	1	6
Washington	5												5													5	1
West Virginia	17	2	5			2							26										1	1	2	28	24
Wyoming	2	1	1										4											1	1	5	1
Total (bituminous)	74	6	29	1	8	6		2		3		1	130	2				2			1		1	4	6	138	117
Pennsylvania (anthracite)	13	2	6	3		5						4	33	1				1	4		3			4	11	45	54
Total, December, 1920	87	8	35	4	8	11		2		3		5	163	3				3	4		4		1	8	17	183	
Total, December, 1919	70	15	25	4	11	9		4		1		8	147			1	4	5	6		2	1	3	7	19		171

DETAILS RELATING TO PRINCIPAL CAUSES OF FATALITIES.

In order that more detailed information may be available regarding accidents attributed generally to falls of roof, haulage, electricity, explosives, etc., all fatal accidents at coal mines since 1916 have been presented in Table 17 according to the bureau's classification of causes. It is believed that the figures therein contained should be of considerable assistance to all persons interested in the prevention of mine accidents.

TABLE 17.—*United States: Coal-mine fatalities by detailed causes, **1916** to **1920**.*

Cause.	1916	1917	1918	1919	1920												
					Jan.	Feb.	Mar.	Apr.	May.	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
NUMBER KILLED UNDERGROUND.																	
1. Falls of roof (coal, rock, etc.):																	
(a) At working face	670	707	764	643	52	40	51	52	38	63	57	52	64	67	42	55	628
(b) In room or chamber	147	178	179	122	15	13	15	13	11	23	12	14	16	12	26	18	188
(c) On road, entry, or gangway	137	164	225	164	7	15	14	10	16	17	18	20	18	11	14	13	173
(d) On slope	8	8	14	17	......	......	......	......	......	3	1	2	......	......	3	1	10
Total	962	1,057	1,182	946	74	68	80	75	60	106	88	88	98	90	85	87	999
2. Falls of face or pillar coal:																	
(a) At working face	87	151	95	129	12	8	6	1	11	13	8	8	5	11	10	6	99
(b) On road, entry, or gangway	16	22	17	25	5	......	2	4	......	2	4	3	3	4	......	2	29
Total	103	173	112	154	17	8	8	5	11	15	12	11	8	15	10	8	128
3. Mine cars and locomotives:																	
(a) Switching and spragging	17	6	15	12	1	1	......	......	......	......	......	......	1	2	1	......	6
(b) Coupling cars	12	7	11	6	......	2	......	2	......	......	1	1	......	2	4	1	13
(c) Falling from trips	43	29	36	17	2	1	......	......	2	1	2	8	3	5	2	......	26
(d) Run over by car or motor	147	187	203	149	15	11	19	13	20	10	11	12	11	14	12	15	163
(e) Caught between car and rib	87	122	113	105	11	9	6	7	4	6	9	13	11	7	8	7	98
(f) Caught between car and roof while riding	12	20	27	23	3	......	2	4	1	1	2	......	3	1	......	1	18
(g) Runaway car or trip	42	67	68	42	1	2	3	2	7	2	4	1	4	7	3	7	43
(h) Miscellaneous	30	50	33	27	2	2	3	9	2	2	2	3	2	3	4	4	38
Total	390	488	506	381	35	28	33	37	36	22	31	38	35	41	34	35	405

4. Gas explosions and burning gas:																	
(a) Due to open light	61	111	55	66	6	4	4	6	8	16	2	13	6	5	13	4	87
(b) Due to defective safety lamps	11	......	2	22	......	......	......	......	......	......	......	......	......	......	......	......	......
(c) Due to electric arc	4	22	3	19	......	......	......	......	......	......	10	......	......	......	......	......	10
(d) Due to shot	5	5	9	6	1	1	......	......	1	4	......	1	......	......	1	......	9
(e) Due to explosions of powder	2	2	3	3	2	1	3	......	1	1	......	......	......	1	......	......	9
(f) Miscellaneous	87	57	23	28	3	......	......	1	......	7	......	......	4	......	......	......	15
Total	170	197	95	144	12	6	7	7	10	28	12	14	10	6	14	4	130
5. Coal-dust explosions (including gas and dust combined):																	
(a) Due to open light	31	123	2	22	......	3	......	......	......	......	......	......	......	......	......	......	3
(b) Due to defective safety lamps	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
(c) Due to electric arc	......	......	4	......	......	......	......	......	......	......	......	......	......	......	......	......	......
(d) Due to shot	22	8	27	24	4	1	1	5	1	......	......	......	......	4	1	5	22
(e) Due to explosions of powder	3	11	1	1	1	......	......	......	......	3	......	......	......	......	1	3	8
(f) Miscellaneous	......	21	......	......	......	......	......	......	1	......	......	......	......	......	......	......	1
Total	56	163	34	47	5	4	1	5	2	3	......	......	......	4	2	8	34
6. Explosives:																	
(a) Transportation	21	6	4	97	1	......	......	......	......	......	2	......	......	......	......	......	3
(b) Charging	9	5	13	14	......	1	1	......	1	......	......	......	......	1	......	......	4
(c) Suffocation	7	10	4	3	......	1	......	1	......	1	1	......	......	......	......	......	4
(d) Drilling into old holes	3	1	2	......	......	1	......	......	......	1	......	......	......	......	1	......	3
(e) Striking in loose rock or coal	......	......	1	......	......	......	......	......	......	......	......	......	......	......	......	......	......
(f) Thawing	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
(g) Caps, detonators, etc	3	2	3	3	......	1	......	......	......	......	2	......	......	......	......	......	3
(h) Unguarded shots	......	2	......	3	......	......	......	......	......	1	1	......	......	......	......	......	2
(i) Returned too soon	15	8	18	5	......	......	......	1	1	1	......	1	3	1	3	1	12
(j) Premature shot	58	44	44	56	7	6	5	8	3	2	3	3	8	4	2	5	56
(k) Sparks from match, lamp, or candle	5	5	13	7	......	......	......	......	1	2	......	......	2	......	......	......	5
(l) Delayed blast	11	5	4	2	2	......	......	1	1	1	......	1	2	2	......	3	13
(m) Shot breaking through rib or pillar	7	10	9	6	1	......	......	......	......	......	......	......	......	......	......	......	1
(n) Miscellaneous	7	12	20	10	5	1	2	2	......	1	1	......	2	......	5	2	21
Total	146	110	135	206	16	11	8	13	7	10	10	5	17	8	11	11	127
7. Suffocation from mine gases	12	8	15	11	......	2	1	1	2	3	......	1	1	4	3	......	18
8. Electricity:																	
(a) Direct contact with trolley wire	66	46	55	39	5	1	2	1	2	3	1	4	5	2	2	1	29
(b) Bar or tool striking trolley wire	5	2	4	2	......	......	......	......	......	......	2	......	1	......	......	......	3
(c) Contact with mining machine	7	5	7	4	2	1	1	......	......	2	......	1	1	1	......	......	9
(d) Contact with machine feed wire	7	16	12	14	3	1	......	......	......	......	3	......	......	1	2	......	10
(e) Contact with haulage motor	1	4	1	2	......	......	......	......	......	......	......	2	......	......	......	1	3
(f) Miscellaneous	4	6	9	8	1	1	2	2	3	3	1	3	3	2	1	......	22
Total	90	79	88	69	11	4	5	3	5	8	7	10	10	6	5	2	76

TABLE 17.—*United States: Coal-mine fatalities by detailed causes, 1916 to 1920*—Continued.

Cause.	1916	1917	1918	1919	1920												
					Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total
NUMBER KILLED UNDERGROUND—continued.																	
9. Animals	8	9	8	2			2					2					4
10. Mining machines (other than 8c)	20	19	17	26	8	3	3		3	5	3		3	2	4	3	37
11. Mine fires (burned, suffocated, etc.)	3	2	26	22	1										7		8
12. Other causes:																	
(a) Fall of person	3	11	5	6		1								1			2
(b) Machinery (other than 10)	2	2	1	3									1				1
(c) Rush of coal or gob	21	22	20	15			1	1	1		3	2				1	9
(d) Falling timber	18	12	12	23	1		3		1	2	1				2	1	11
(e) Suffocation in chutes	1	2	3	2	1								1	1	1	2	6
(f) Hand tools, axes, bars, etc																	
(g) Nails, splinters, etc				1													
(h) Miscellaneous	22	21	22	19	2		5	1			3	2		1	1	1	16
Total	67	70	63	69	4	1	9	2	2	2	7	4	2	3	4	5	45
Total underground	**2,027**	**2,375**	**2,281**	**2,077**	**183**	**135**	**157**	**148**	**138**	**202**	**170**	**173**	**184**	**179**	**179**	**163**	**2,011**
NUMBER KILLED IN SHAFT.																	
13. Falling down shafts or slopes	31	21	21	20	3	7	1		4	4			1	2	2	3	27
14. Objects falling down shafts or slopes	2	12	9	6	1					1		6					8
15. Cage, skip, or bucket:																	
(a) Runaway			1	8	5			2	3						1		11
(b) Riding with rock or coal		1		1								1		1			2
(c) Riding with timber or tools	5	13		2													
(d) Struck by	4	6	9	4		1	1		1						1		4
(e) Miscellaneous	3	2	7	6							2						2
Total	12	22	17	21	5	1	1	2	4		2	1		1	2		19

16. Other causes:																	
(a) Overwinding	1	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
(b) Breaking of cables	....	2	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
(c) Miscellaneous	3	1	4	6	....	....	....	....	....	....	....	1	....	....	1	....	2
Total	4	5	5	6	....	....	....	....	....	....	....	1	....	....	1	....	2
Total shaft	**49**	**60**	**52**	**53**	**9**	**8**	**2**	**2**	**8**	**5**	**2**	**8**	**1**	**3**	**5**	**3**	**56**
NUMBER KILLED ON SURFACE.																	
17. Mine cars and mine locomotives	59	74	87	71	5	6	9	5	5	3	2	5	3	4	3	4	54
18. Electricity	7	17	15	10	1	2	1	1	2	1	3	3	1	2	....	....	17
19. Machinery	22	46	40	22	3	2	2	2	4	1	1	1	1	2	1	4	24
20. Boiler explosions or bursting steam pipes	4	8	7	6	....	....	....	....	....	1	1	1	....	....	1	....	4
21. Railway cars and locomotives	16	36	31	22	3	1	3	1	2	1	2	6	....	1	3	1	24
22. Other causes:																	
(a) Explosives	2	13	11	1	2	....	....	....	....	....	8	1	....	....	....	....	11
(b) Fall of person	9	19	12	15	....	1	1	2	1	....	....	1	....	2	1	....	9
(c) Falling objects (derricks, booms, etc.)	7	7	12	9	1	1	1	....	....	....	1	....	3	....	1	2	10
(d) Suffocation in chute, bin, or culm	6	4	4	3	....	3	....	....	....	1	1	1	....	....	....	....	6
(e) Falls or slides of rock or coal	....	3	3	10	....	....	....	1	1	1	....	1	3	....	....	2	9
(f) Steam shovels	....	3	2	2	....	....	....	....	....	....	....	....	....	....	....	....	....
(g) Hand tools	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....
(h) Miscellaneous	18	31	23	14	1	1	5	....	2	3	2	2	1	1	3	4	25
Total	42	80	67	56	4	6	7	3	4	5	12	6	7	3	5	8	70
Total surface	**150**	**261**	**247**	**187**	**16**	**17**	**22**	**12**	**17**	**12**	**21**	**22**	**12**	**12**	**13**	**17**	**193**
Grand total	**2,226**	**2,696**	**2,580**	**2,317**	**208**	**160**	**181**	**162**	**163**	**219**	**193**	**203**	**197**	**194**	**197**	**183**	2,260

TABLE 18.—*United States: Coal-mine fatalities during the year ended Dec. 31, 1920, by months and States.*

State.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Alabama	2	2	9	5	7	6	4	2	9	5	19	6	76
Alaska													0
Arkansas	2	1	1				1			1	2	1	9
California, Idaho, and Nevada													0
Colorado	10	6	5	4	7	7	5	1	7	4	7	7	70
Georgia and North Carolina													0
Illinois	15	17	18	9	10	24	11	24	17	29	18	15	207
Indiana	9	6	4	6	9	5	3	7	15	12	6	6	88
Iowa	2	2	2	2	3	1	1	4	3	2	1	2	25
Kansas	5	1	1	1	1	3	2		2	2	5	3	26
Kentucky	11	7	7	7	7	13	7	11	14	14	18	4	120
Maryland		1	1		1		2		1	1			7
Michigan			2	1	2		1						6
Missouri	1			2	1		2				4	1	11
Montana	1		1	2	2		1		1	1	1	4	14
New Mexico	2	1	5	12		5	2		4		2		33
North Dakota		1									2		3
Ohio	5	10	13	14	3	14	12	11	18	12	11	11	134
Oklahoma	5	1	2	4	1	6		12	3	2	3	2	41
Oregon													0
Pennsylvania (bituminous)	43	31	29	31	24	52	41	42	45	29	29	31	427
South Dakota													0
Tennessee	1	1	3		2	2	1	2	1	1	5	2	21
Texas				1	1		1	1	1				5
Utah	3	6			2	2	3	4	3	6	1	4	34
Virginia	6	3	2	1	2	1	3	2		3	2	1	26
Washington	3	1	1		2		4	1	1			5	18
West Virginia	31	20	24	21	21	24	30	34	31	33	26	28	323
Wyoming	4	3	3	4	3	4	12	3	1	2	5	5	49
Total (bituminous)	**161**	**121**	**133**	**127**	**111**	**169**	**149**	**161**	**177**	**159**	**167**	**138**	**1,773**
Pennsylvania (anthracite)	**47**	**39**	**48**	**35**	**52**	**50**	**44**	**42**	**20**	**35**	**30**	**45**	**487**
Total, 1920	**208**	**160**	**181**	**162**	**163**	**219**	**193**	**203**	**197**	**194**	**197**	**183**	**2,260**

PRINCIPAL COAL-MINE DISASTERS.

Table 19 gives a list of mine disasters in the United States since 1911, in each of which five or more men were killed. It will be noted that the past year showed an improvement over 1919 in the total number of lives lost in such accidents. The average number of deaths caused by each major disaster in 1920 was lower than for any other year covered by the table.

TABLE 19.—*Coal-mine disasters in the United States, 1911 to 1920, in which 5 or more men were killed.*

Date.		Name of mine.	Location of mine.	Nature of accident.	Killed.
1911	Jan. 20	Carbon Hill	Carbon Hill, Va.	Gas explosion	5
1911	Feb. 9	Cokedale	Trinidad, Colo.	Coal-dust explosion	17
1911	Mar. 18	No. 16	Mineral, Kans.	Gas explosion	5
1911	Mar. 22	Hazel	East Canonsburg, Pa.	Fall of roof	9
1911	Apr. 7	Price-Pancoast	Throop, Pa.	Mine fire	72
1911	Apr. 8	Banner	Littleton, Ala.	Coal-dust explosion	128
1911	Apr. 24	Ott No. 20	Elk Garden, W. Va.	do	23
1911	May 27	Cameron	Shamokin, Pa.	Gas explosion	5
1911	July 13	Sykesville	Sykesville, Pa.	do	21
1911	Sept. 12	Marvine	Scranton, Pa.	Mine cars	5
1911	Oct. 3	Drifton No. 2	Freeland, Pa.	Cave-in	5
1911	Oct. 23	O'Gara No. 9	Harrisburg, Ill.	Gas explosion	8
1911	Nov. 9	Adrian	Punxsutawney, Pa.	Coal-dust explosion	8
1911	Nov. 18	Bottom Creek	Vivian, W. Va.	do	18
1911	Dec. 9	Cross Mountain	Briceville, Tenn.	do	84
1912	Jan. 9	Parrish	Plymouth, Pa.	Gas explosion	6
1912	Jan. 16	Carbon Hill	Carbon Hill, Va.	Dynamite explosion	5
1912	Jan. 19	Central	Central City, Ky.	Coal-dust explosion	5
1912	Jan. 20	Kemmerer No. 4	Kemmerer, Wyo.	do	6
1912	Feb. 22	Western No. 5	Lehigh, Okla.	Mine fire	9
1912	Mar. 20	San Bois No. 2	McCurtain, Okla.	Gas explosion	73
1912	Mar. 26	Jed	Jed, W. Va.	Coal-dust explosion	81
1912	Apr. 21	Coil	Madisonville, Ky.	Gas explosion	5
1912	June 18	Hastings	Hastings, Colo.	do	12
1912	July 11	Panama	Moundsville, W. Va.	do	8
1912	July 16	Old Dominion No. 1	Carbon Hill, Va.	do	8
1912	July 24	Superba and Lemont	Evans Station, Pa.	Cloudburst flooded mine.	[a] 18
1912	Aug. 13	Abernant	Abernant, Ala.	Gas explosion	18
1913	Feb. 19	Seagraves	Eldorado, Ill.	do	5
1913	Apr. 23	Cincinnati	Finleyville, Pa.	Coal-dust explosion	96
1913	May 6	Taylor	Hartford, Ky.	Overcome by gas	5
1913	May 17	Imperial	Belle Valley, Ohio.	Gas explosion	15
1913	Aug. 2	East Brookside	Tower City, Pa.	do	19
1913	Oct. 22	Stag Canon No. 2	Dawson, N. Mex.	Coa.-dust explosion	263
1913	Nov. 18	Acton No. 2	Acton, Ala.	do	24
1913	Dec. 16	Vulcan	New Castle, Colo.	do	37
1914	Jan. 10	Rock Castle	Rock Castle, Ala.	Gas explosion	12
1914	Jan. 14	Spencer-Newland	Mulberry, Kans.	Cage with men fell down shaft.	6
1914	Apr. 28	Eccles Nos. 5 and 6	Eccles, W. Va.	Gas explosion	181
1914	Apr. 29	Union Pacific No. 2	Cumberland, Wyo.	Mine cars	5
1914	May 29	Maryd	Maryd, Pa.	Overwinding of cage	6
1914	June 30	Cinderella	Cinderella, W. Va.	Suffocated by fumes from fire in fan house.	5
1914	Sept. 4	No. 1	Adamson, Okla.	Cave-in	13
1914	Sept. 16	Lehigh No. 4	Lansford, Pa.	Gas explosion	7
1914	Oct. 5	Mulga	Mulga, Ala.	do	16
1914	Oct. 27	North or No. 1	Royalton, Ill.	do	52
1914	Dec. 9	Tripp	Scranton, Pa.	Collapse of bottom of cage.	13
1915	Feb. 6	Carlisle	Carlisle, W. Va.	Gas explosion	21
1915	Feb. 17	Prospect	Wilkes-Barre, Pa.	do	13
1915	Feb. 18	Atlas	Rich Hill, Mo.	Powder and mine explosion.	5
1915	Mar. 2	Layland No. 3	Layland, W. Va.	Coal-dust explosion	112
1915	Apr. 5	Shoal Creek	Panama, Ill.	Gas explosion	11
1915	May 24	Smokeless Valley No. 1	Johnstown, Pa.	do	9
1915	July 27	United Coal No. 1	Christopher, Ill.	do	9
1915	July 30	Patterson No. 2	Elizabeth, Pa.	Mine cars	9
1915	Aug. 31	Orenda	Boswell, Pa.	Gas explosion	19
1915	Nov. 16	Northwestern	Ravensdale, Wash.	Coal-dust explosion	31
1915	Nov. 30	Boomer No. 2	Boomer, W. Va.	Gas explosion	23

[a] Not included in State inspector's statement of mine fatalities.

TABLE 19.—*Coal-mine disasters in the United States, 1911 to 1920, in which 5 or more men were killed*—Continued.

Date.		Name of mine.	Location of mine.	Nature of accident.	Killed.
1916	Feb. 8	Lance	Plymouth, Pa	Gas explosion	7
1916	Feb. 11	Jefferson and Clearfield No. 2.	Ernest, Pa	do	27
1916	Feb. 29	Davis No. 42	Kempton, W. Va.-Md.	Coal-dust explosion	16
1916	Mar. 9	Hollenback	Wilkes-Barre, Pa	Gas explosion	6
1916	Mar. 28	King	Kimball, W. Va	do	6
1916	Mar. 30	Robindale	Seward, Pa	do	8
1916	Aug. 8	Woodward	Wilkes-Barre, Pa	do	6
1916	Oct. 19	Jamison No. 7	Barrackville, W. Va	do	10
1916	Oct. 22	Roden	Marvel, Ala	do	18
1916	Nov. 4	Bessie	Palos, Ala	do	30
1916	Dec. 13	Fidelity No. 9	Stone City, Kans	do	20
1917	Mar. 13	Henderson No. 1	Hendersonville, Pa	do	14
1917	Apr. 18	Lynden	Mason, W. Va	Lightning exploded powder in powder house.	5
1917	Apr. 27	Hastings	Hastings, Colo	Coal-dust explosion	121
1917	June 2	Rend No. 2	Herrin, Ill	Gas explosion	9
1917	Aug. 4	West Kentucky No. 7	Clay, Ky	do	62
1917	Nov. 29	Old Ben No. 11	Christopher, Ill	Coal dust explosion	17
1917	Dec. 15	Yukon No. 1	Bluefield, W. Va	Gas explosion	17
1917	Dec. 17	Wilkeson	Wilkeson, Wash	Inrush of water and gravel.	6
1917	Dec. 20	Nemo	Harriman, Tenn	Coal dust explosion	11
1918	May 20	Villa	Charleston, W. Va	Mine fire	13
1918	Aug. 7	Harmar	Harmarville, Pa	Gas explosion	8
1918	Aug. 28	Burnett	Burnett, Wash	Coal-dust explosion	12
1918	Sept. 28	North	Royalton, Ill	Gas explosion	21
1919	Mar. 31	Empire	Aguilar, Colo	do	13
1919	Apr. 29	Majestic	Majestic, Ala	Coal-dust explosion	22
1919	June 5	Baltimore tunnel No. 2	Wilkes-Barre, Pa	Powder explosion	92
1919	June 30	Alderson No. 5	Alderson, Okla	Gas explosion	15
1919	July 8	Lansford colliery	Lansford, Pa	do	8
1919	July 18	Carswell	Kimball, W. Va	do	6
1919	Aug. 6	Weirwood	Weirwood, W. Va	do	7
1919	Aug. 18	Oakdale	Laveta, Colo	do	18
1919	Oct. 29	Amsterdam No. 2	Amsterdam, Ohio	Mine fire	20
1920	Apr. 14	Dawson, Nos. 1 and 6	Dawson, N. Mex	Coal-dust explosion	5
1920	May 3	Submarine	Clinton, Ind	Gas explosion	5
1920	June 2	Ontario	Cokeburg, Pa	do	6
1920	July 19	Union	Renton, Pa	do	9
1920	July 26	No. 6	Sublet, Wyo	Blowing up of powder magazine.	8
1920	Aug. 21	No. 19	Degnan, Okla	Gas explosion	10
1920	Nov. 16	Arnold	Earlington, Ky	Mine fire	6
1920	Nov. 23	Parrish	Parrish, Ala	Gas explosion	12

TABLE 20.—*Production, men employed, and number killed in and about the coal mines in the United States during the year ended Dec. 31, **1918**.*

State.	Production (short tons).[a]	Number employed.[a]			Number of days of labor performed.[a]	Average days active.[a]	Number killed.			Number killed per 1,000 300-day workers.			Number killed per 1,000,000 short tons mined.	Production per death (short tons).
		Underground.	Surface.	**Total.**			Underground.	Surface	**Total.**	Underground.	Surface.	**Total.**		
Alabama	19,184,962	20,584	5,637	**26,221**	7,296,267	278	107	3	**110**	5.61	0.57	4.52	5.73	174,409
Alaska	75,606	170	69	**239**	60,798	254	....	....	**0**	....	....	....	....	....
Arkansas	2,227,369	3,107	871	**3,978**	810,175	204	13	....	**13**	6.16	....	4.81	5.84	171,336
California, Idaho, and Nevada	6,400	10	5	**15**	3,600	240	....	....	**0**	....	....	....	....	....
Colorado	12,407,571	11,320	3,163	**14,483**	3,700,277	255	69	2	**71**	7.16	.74	5.76	5.72	174,755
Georgia and North Carolina	68,136	170	70	**240**	50,964	212	1	1	**2**	8.33	20.00	11.76	29.35	34,068
Illinois	89,291,105	75,270	10,695	**85,965**	20,423,880	238	237	1	**238**	3.98	.12	3.50	2.67	375,173
Indiana	30,678,634	23,979	6,397	**30,376**	6,903,152	227	95	5	**100**	5.23	1.03	4.35	3.26	306,786
Iowa	8,192,195	11,774	1,554	**13,328**	3,262,663	245	30	1	**31**	3.12	.79	2.85	3.78	264,264
Kansas	7,561,947	8,652	2,013	**10,665**	2,490,982	234	29	3	**32**	4.31	1.91	3.85	4.23	236,311
Kentucky	31,612,617	30,323	9,019	**39,342**	9,037,719	230	69	8	**77**	2.97	1.16	2.56	2.44	410,553
Maryland	4,497,297	4,377	1,191	**5,568**	1,453,043	261	17	....	**17**	4.47	....	3.51	3.78	264,547
Michigan	1,464,818	2,207	351	**2,558**	606,204	237	10	2	**12**	5.73	7.22	5.94	8.19	122,068
Missouri	5,667,730	7,644	1,946	**9,590**	2,249,580	235	13	....	**13**	2.18	....	1.73	2.29	435,979
Montana	4,532,505	3,347	1,212	**4,559**	1,202,168	264	14	3	**17**	4.76	2.82	4.24	3.75	266,618
New Mexico	4,023,239	2,971	1,124	**4,095**	1,232,985	301	29	2	**31**	9.73	1.77	7.54	7.71	129,782
North Dakota	719,733	602	226	**828**	189,340	229	....	....	**0**	....	....	....	....	....
Ohio	45,812,943	39,883	8,567	**48,450**	10,789,416	223	136	13	**149**	4.59	2.04	4.14	3.25	307,469
Oklahoma	4,813,447	7,057	1,394	**8,451**	1,928,896	228	30	1	**31**	5.59	.94	4.82	6.44	155,272
Oregon	13,328	25	15	**40**	11,660	292	....	....	**0**	....	....	....	....	....
Pennsylvania (bituminous)	178,550,741	140,502	33,804	**174,306**	46,947,769	269	448	43	**491**	3.55	1.42	3.14	2.75	363,647
South Dakota	7,942	21	....	**21**	3,043	145	....	....	**0**	....	....	....	....	....
Tennessee	6,831,048	8,198	2,496	**10,694**	2,833,459	265	14	....	**14**	1.93	....	1.48	2.05	487,932
Texas	2,261,135	3,391	545	**3,936**	1,029,677	262	7	....	**7**	2.37	....	2.04	3.10	323,019
Utah	5,136,825	3,065	1,095	**4,160**	1,078,770	259	15	4	**19**	5.66	4.22	5.28	3.70	270,360
Virginia	10,289,808	8,788	2,216	**11,004**	3,045,971	277	41	2	**43**	5.06	.98	4.24	4.18	239,298
Washington	4,082,212	3,836	1,273	**5,109**	1,402,499	275	31	2	**33**	8.83	1.72	7.06	8.08	123,703
West Virginia	89,935,839	69,047	20,483	**89,530**	21,278,061	238	386	51	**437**	7.06	3.14	6.10	4.86	205,803
Wyoming	9,438,688	5,932	1,622	**7,554**	2,025,012	268	39	2	**41**	7.36	1.38	6.07	4.34	230,212
Total (bituminous)	**579,385,820**	**496,252**	**119,053**	**615,305**	**153,348,030**	**249**	**1,880**	**149**	**2,029**	**4.56**	**1.51**	**3.97**	**3.50**	**285,552**
Pennsylvania (anthracite)	98,826,084	101,671	45,450	**147,121**	43,143,954	293	453	98	**551**	4.56	2.21	3.83	5.58	179,358
Total, 1918	**678,211,904**	**597,923**	**164,503**	**762,426**	**196,491,984**	**258**	**2,333**	**247**	**2,580**	**4.54**	**5.98**	**3.94**	**3.80**	**262,873**

[a] Data furnished by the U. S. Geological Survey.

Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

TABLE 21.—*United States: Coal-mine fatalities during the year ended Dec. 31,* ***1919,*** *by causes and States.*

[Revised.]

State.	Underground.													Shaft.					Surface.							Total by States.	
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Gas explosions and burning gas.	Coal-dust explosions (including gas and dust combined).	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	Total.	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip, or bucket.	Other causes.	Total.	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes.	Railway cars and locomotives.	Other causes.	Total.	1919	1918
Alabama	36		15	2	22	2		9		1		1	88						1		1		3		5	93	110
Alaska																										0	0
Arkansas	6	1			1			1					9											1	1	10	13
California, Idaho, and Nevada																										0	0
Colorado	20	20	8	31			1	6	1				87			1		1	1		1	1			3	91	71
Georgia and North Carolina																										0	2
Illinois	77	9	43	8	7	2		9				2	157	6		4		10					1	1	2	169	238
Indiana	33		17	9	10	5	1			1			76	2		3		5			1			1	2	83	100
Iowa	11		3	1				2					17													17	31
Kansas	14			1	2	1	2					1	21	1	1			2	1					1	2	25	32
Kentucky	42	1	14		3	6		5		1			72						3	2			2	5	12	84	77
Maryland	3		1			1							5													5	17
Michigan	2		1										3													3	12
Missouri	5	1		1		1	1						9			1		1								10	18
Montana	2	2	3	1									8	1		1		2	1						1	11	17
New Mexico	14	1	5										20							1				4	5	25	31
North Dakota	2		1										3											1	1	4	0
Ohio	76	1	19	2		10		3		1	20	1	133		1	1		2	3				2	2	7	142	149
Oklahoma	11		5	16	1			3					36													36	31
Oregon																										0	0
Pennsylvania (bituminous)	188	36	79	10		17		12		9	2	9	362	3	1	2	4	10	9	2	5		4	7	27	399	491
South Dakota																										0	0
Tennessee	18		8			1							27													27	14
Texas																2	1	3								3	7
Utah	14	1	4	1		1				3			24						1				1	1	3	27	19
Virginia	7	4	13			1		2		1		4	32			1		1						1	1	34	43
Washington	3		2	1		1		1				6	14						2		2			1	5	19	33
West Virginia	171	17	63	15		6		12		9		2	295		1	2		3	20	3	1	1	2	7	34	332	437
Wyoming	19	3	4	3	1	2						1	33													33	41
Total (bituminous)	**774**	**97**	**308**	**102**	**47**	**57**	**5**	**65**	**1**	**26**	**22**	**27**	**1,531**	**13**	**4**	**18**	**5**	**40**	**42**	**8**	**11**	**2**	**15**	**33**	**111**	**1,682**	**2,029**
Pennsylvania (anthracite)	172	57	73	42		149	6	4	1			42	546	7	2	3	1	13	29	2	11	4	7	23	76	635	551
Total, 1919	**946**	**154**	**381**	**144**	**47**	**206**	**11**	**69**	**2**	**26**	**22**	**69**	**2,077**	**20**	**6**	**21**	**6**	**53**	**71**	**10**	**22**	**6**	**22**	**56**	**187**	**2,317**	
Total, 1918	1,182	112	506	95	34	135	15	88	8	17	26	63	2,281	21	9	17	5	52	87	15	40	7	31	67	247		2,580

TABLE 22.—*Coal-mine fatalities: Percentages by causes,* ***1911*** *to* ***1920.***

Cause.	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920
Underground:										
Falls of roof (coal, rock, etc.)	39.65	40.30	38.06	40.14	40.50	43.22	39.21	45.82	40.83	44.20
Falls of face or pillar coal	7.76	8.72	7.33	5.95	7.05	4.63	6.42	4.34	6.65	5.66
Mine cars and locomotives	14.38	15.34	15.22	15.48	15.29	17.52	18.10	19.61	16.44	17.92
Gas explosions and burning gas	3.73	7.65	3.27	13.53	6.74	7.64	7.31	3.68	6.21	5.75
Coal-dust explosions (including gas and dust combined)	10.02	4.34	15.19	.69	6.66	2.51	6.04	1.32	2.03	1.51
Explosives	6.02	6.08	4.96	5.95	6.83	6.56	4.08	5.23	8.89	5.62
Suffocation from mine gases	.75	.25	1.18	.57	.71	.54	.30	.58	.47	.80
Electricity	3.54	3.31	2.87	3.63	3.92	4.04	2.93	3.41	2.98	3.36
Animals	.26	.25	.32	.29	.13	.36	.33	.31	.09	.18
Mining machines	.34	.29	.86	.81	.53	.90	.70	.66	1.12	1.64
Mine fires (burned, suffocated, etc.)	2.82	.45	.14	.29	.05	.13	.07	1.01	.95	.35
Other causes	2.37	2.27	2.59	2.32	2.78	3.01	2.60	2.44	2.98	1.99
Total	**91.64**	**89.25**	**91.99**	**89.65**	**91.19**	**91.06**	**88.09**	**88.41**	**89.64**	**88.98**
Shaft:										
Falling down shafts or slopes	1.28	1.36	1.80	2.85	1.36	1.39	.78	.81	.86	1.20
Objects falling down shafts or slopes	......	.21	.04	.21	.09	.09	.45	.35	.26	.35
Cage, skip, or bucket	.60	.83	.32	.49	.31	.54	.82	.66	.91	.84
Other causes	.08	.12	.07	.04	......	.18	.18	.19	.26	.09
Total	**1.96**	**2.52**	**2.23**	**3.59**	**1.76**	**2.20**	**2.23**	**2.01**	**2.29**	**2.48**
Surface:										
Mine cars and mine locomotives	2.30	3.23	2.80	2.77	2.73	2.65	2.74	3.38	3.06	2.39
Electricity	.19	.33	.29	.44	.44	.31	.63	.58	.43	.75
Machinery	1.17	1.36	.93	1.06	1.15	.99	1.71	1.55	.95	1.06
Boiler explosions or bursting steam pipes	.26	.21	.04	.21	.26	.18	.30	.27	.26	.18
Railway cars and locomotives	.45	.58	.29	.53	.62	.72	1.33	1.20	.95	1.06
Other causes	2.03	2.52	1.43	1.75	1.85	1.89	2.97	2.60	2.42	3.10
Total	**6.40**	**8.23**	**5.78**	**6.76**	**7.05**	**6.74**	**9.68**	**9.58**	**8.07**	**8.54**
Grand total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Total killed	2,656	2,419	2,785	2,454	2,269	2,226	2,696	2,580	2,317	2,260

COAL PRODUCTION AND FATALITIES, BY MONTHS, 1920.

Table 23 shows the monthly production of coal since 1913 as estimated by the United States Geological Survey. The number of coal-mine fatalities arranged by corresponding months is given in Table 24. Considered together, these two tables are of interest as indicating the fluctuations in output and number of fatalities in different seasons of the year, as well as the relationship between production and accidents in different months.

TABLE 23.—*Monthly production of anthracite and of bituminous coal in the United States, **1913** to **1920**.*[a]

[Net tons.]

	1913		1914		1915		1916		1917		1918		1919		1920	
	Tons.	Per cent.	Tons.	Per cent.	Tons.	Per cent.	Tons.	Per cent.	Tons.	Per cent.	Tons.	Per cent.	Tons.	Per cent.	Tons.	Per cent.
Bituminous:																
January	42,276,000	8.8	40,188,000	9.5	37,190,000	8.4	46,596,000	9.3	47,967,000	8.7	42,227,000	7.3	41,487,000	9.1	48,688,000	8.7
February	37,057,000	7.7	35,472,000	8.4	29,321,000	6.6	45,187,000	9.0	41,353,000	7.5	43,777,000	7.6	31,566,000	6.9	40,127,000	7.2
March	37,536,000	7.8	45,455,000	10.8	31,801,000	7.2	43,827,000	8.7	47,869,000	8.7	48,113,000	8.3	33,719,000	7.3	46,792,000	8.4
April	34,169,000	7.2	23,609,000	5.6	29,968,000	6.8	33,628,000	6.7	41,854,000	7.6	46,041,000	8.0	32,164,000	7.0	37,939,000	6.8
May	37,205,000	7.8	28,551,000	6.8	30,938,000	7.0	38,804,000	7.7	47,086,000	8.5	50,443,000	8.7	37,547,000	8.2	39,752,000	7.1
June	37,405,000	7.8	31,412,000	7.4	33,957,000	7.7	37,742,000	7.5	46,824,000	8.5	51,138,000	8.8	37,054,000	8.1	43,767,000	7.9
July	38,858,000	8.1	34,305,000	8.1	35,573,000	8.0	38,113,000	7.6	46,292,000	8.4	54,971,000	9.5	42,698,000	9.3	45,523,000	8.2
August	41,590,000	8.7	37,751,000	8.9	38,161,000	8.6	42,696,000	8.5	47,372,000	8.6	55,114,000	9.5	42,883,000	9.4	48,389,000	8.7
September	41,424,000	8.7	39,019,000	9.2	40,964,000	9.3	42,098,000	8.4	45,108,000	8.2	51,183,000	8.8	47,402,000	10.3	49,202,000	8.8
October	46,164,000	9.7	37,685,000	8.9	44,198,000	10.0	44,807,000	8.9	48,337,000	8.7	52,300,000	9.0	56,243,000	12.3	52,635,000	9.5
November	43,233,000	9.0	33,392,000	7.9	44,737,000	10.1	44,927,000	8.9	47,690,000	8.6	43,895,000	7.6	18,688,000	4.1	51.013,000	9.2
December	41,519,000	8.7	35,862,000	8.5	45,814,000	10.3	44,098,000	8.8	44,037,000	8.0	40,184,000	6.9	36,612,000	8.0	52,736,000	9.5
Total bituminous	**478,434,000**	**100.0**	**422,704,000**	**100.0**	**442,626,000**	**100.0**	**502,520,000**	**100.0**	**551,791,000**	**100.0**	**579,386,000**	**100.0**	**453,063,000**	**100.0**	**556,563,000**	**100.00**
Anthracite:																
January	8,396,000	9.2	6,878,000	7.6	6,337,000	7.1	7,649,000	8.7	7,672,000	7.7	7,270,000	7.3	7,819,000	8.9	7,588,000	8.5
February	7,519,000	8.2	5,477,000	6.0	5,703,000	6.4	7,404,000	8.5	6,688,000	6.7	7,494,000	7.6	5,102,000	5.8	6,525,000	7.3
March	6,505,000	7.1	6,863,000	7.6	6,654,000	7.5	7,961,000	9.1	9,026,000	9.1	9,382,000	9.5	5,190,000	5.9	7,857,000	8.8
April	7,906,000	8.6	8,069,000	8.9	8,725,000	9.8	5,837,000	6.7	7,222,000	7.3	8,211,000	8.3	6,884,000	7.8	6,225,000	7.0
May	7,945,000	8.7	8,348,000	9.2	7,807,000	8.8	7,212,000	8.2	8,933,000	9.0	8,880,000	9.0	7,525,000	8.5	7,950,000	8.9
June	7,911,000	8.6	8,147,000	9.0	7,157,000	8.0	7,327,000	8.4	9,103,000	9.1	8,855,000	9.0	7,404,000	8.4	8,171,000	9.2
July	7,272,000	7.9	7,165,000	7.9	6,691,000	7.5	7,062,000	8.1	8,684,000	8.7	9,134,000	9.2	7,974,000	9.1	8,261,000	9.3
August	7,116,000	7.8	7,288,000	8.0	7,161,000	8.0	7,190,000	8.2	9,058,000	9.1	9,258,000	9.4	8,096,000	9.2	8,025,000	9.0
September	7,384,000	8.1	8,301,000	9.1	7,423,000	8.3	7,206,000	8.2	8,230,000	8.2	8,038,000	8.1	7,494,000	8.5	4,646,000	5.2
October	8,399,000	9.2	8,830,000	9.7	8,761,000	9.9	7,630,000	8.7	9,183,000	9.2	8,105,000	8.2	8,645,000	9.8	8,069,000	9.1
November	7,668,000	8.4	7,878,000	8.7	8,514,000	9.6	7,790,000	8.9	8,453,000	8.5	6,803,000	6.9	7,870,000	8.9	7,453,000	8.4
December	7,504,000	8.2	7,578,000	8.3	8,062,000	9.1	7,257,000	8.3	7,360,000	7.4	7,396,000	7.5	8,089,000	9.2	8,321,000	9.3
Total anthracite	**91,525,000**	**100.0**	**90,822,000**	**100.0**	**88,995,000**	**100.0**	**87,578,000**	**100.0**	**99,612,000**	**100.0**	**98,826,000**	**100.0**	**88,092,000**	**100.0**	**89,100,000**	**100.0**
Grand total	**570,048,125**	......	**513,525,477**	......	**531,619,487**	......	**590,098,175**	......	**651,402,374**	......	**678,211,904**	......	**546,155,000**	......	645,663,000	......

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[a] Monthly production estimated for bituminous coal on basis of rail shipments; for anthracite, on basis of monthly reports of Anthracite Bureau of Information. The above monthly production figures were compiled by the U. S. Geological Survey, and percentages calculated by the U. S. Bureau of Mines.

TABLE 24.—*Coal-mine fatalities by months and years, **1913** to **1920**.*

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Bituminous:													
1913	168	150	150	229	144	139	137	176	132	426	168	148	2,167
1914	167	130	165	298	101	143	125	141	148	192	113	136	1,859
1915	113	133	235	114	99	104	165	129	135	133	181	112	1,683
1916	135	178	128	115	116	108	139	155	116	145	179	157	1,671
1917	170	130	182	260	136	188	189	217	140	142	173	187	2,114
1918	160	171	148	169	168	183	214	194	198	172	125	127	2,029
1919	139	129	138	141	141	151	154	180	138	195	59	117	1,682
1920	161	121	133	127	111	169	149	161	177	159	167	138	1,773
Total	1,213	1,142	1,279	1,453	1,016	1,185	1,272	1,353	1,184	1,564	1,165	1,152	14,978
Anthracite:													
1913	55	58	52	56	62	53	47	67	41	50	34	43	618
1914	36	42	48	56	63	47	43	39	61	61	46	53	595
1915	53	46	47	55	54	45	32	50	43	56	59	46	556
1916	64	47	70	39	28	39	40	53	45	52	32	46	555
1917	57	38	48	49	45	44	58	52	41	55	57	38	582
1918	55	51	48	46	43	47	62	55	32	43	32	37	551
1919	44	31	33	48	44	144	68	43	41	49	36	54	635
1920	47	39	48	35	52	50	41	42	20	35	30	45	487
Total	411	352	394	384	391	469	394	401	324	401	326	362	4,609

TABLE 25.—*United States: Coal-mine fatalities during the years* ***1914*** *to* ***1920,*** *inclusive, by causes and States.*

[The number in parentheses after each State refers to a like State table bearing the same number in Bulletin 115.]

State.	Underground.													Shaft.					Surface.							Total by States.
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Gas explosions and burning gas.	Coal-dust explosions (including gas and dust combined).	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	Total.	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip, or bucket.	Other causes.	Total.	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes.	Railway cars and locomotives.	Other causes.	Total.	Grand total.
	1	2	3	4	5	6	7	8	9	10	11	12		13	14	15	16		17	18	19	20	21	22		
Alabama (86):																										
1914	53		24	37		1		11		1			127										1		1	128
1915	21	2	17	5		7		8					60			1		1			1			1	2	63
1916	28		15	23	32	3		10				4	115			1		1					1	2	3	119
1917	49	3	24	12		3		9					100						3		4		1		8	108
1918	58		23	6	2	5	2	4				6	106	1				1				1	2		3	110
1919	36		15	2	22	2		9		1		1	88						1		1		3		5	93
1920	29	5	14	13		6		4		1			72						1				1	2	4	76
Alaska:																										
1914																										0
1915																										0
1916																										0
1917																										0
1918																										0
1919																										0
1920																										0
Arkansas (88):																										
1914	3		3	2	1	1							10											1	1	11
1915	5			1									6								1		1		2	8
1916	4			1	2								7													7
1917	7		1	2	5							1	16			1		1								17
1918	3		3	2	4			1					13													13
1919	6	1			1			1					9											1	1	10
1920	7			1									8											1	1	9

California (90), Idaho, and Nevada:																										
1914																										0
1915																										0
1916																										0
1917																										0
1918																										0
1919																										0
1920																										0
Colorado (92):																										
1914	40	2	13	1		4		6		2		4	72			1		1						2	2	75
1915	40	1	8	3			2	3				2	59	1				1			2			1	3	63
1916	17	8	7			1		5				1	39						1		1	1		1	4	43
1917	32	12	12	1	121	1		2		1		2	184						3		1				4	188
1918	18	17	20	5		2		5	1			1	69								1		1		2	71
1919	20	20	8	31			1	6	1				87			1		1	1		1	1			3	91
1920	23	11	23			3		5					65			1		1			1			3	4	70
Georgia (94):																										
1914	1												1													1
1915																										0
1916																						1			1	1
1917	1												1													1
1918	1												1											1	1	2
1919																										0
1920																										0
Illinois (96):																										
1914	49	20	38	55		9		2		2	1		176	4	2	1	1	8			2		3	4	9	193
1915	45	12	29	20	2	11	1	6					126	3	1	1		5			1		4		5	136
1916	48	2	54	7		6		1			1	5	124	3		1		4								128
1917	61	16	58	18	17	9		10	4	1		8	202	5		8		13		1	2	3	8	4	18	233
1918	100		67	29	4	12		7	2		3	4	228		5	3	1	9					1		1	238
1919	77	9	43	8	7	2		9				2	157	6		4		10					1	1	2	169
1920	97	1	50	11	4	9		15		2	1	3	193	8		2		10	1				3		4	207
Indiana (98):																										
1914	18	3	4	2	1	6		2	1	1		2	40			2		2					2		2	44
1915	17	2	7	2		10		3					41	1		1		2					1	2	3	46
1916	16	1	12	4	2	5		3					43	2		2	2	6			1			1	2	51
1917	34	3	12	8		8		5					70	1	1		3	5						1	1	76
1918	43	2	19	8	2	10		5					89	3		1	2	6	1				2	2	5	100
1919	33		17	9	10	5	1			1			76	2		3		5			1			1	2	83
1920	41		10	15	7	3	3	3		1		1	84	1		2	1	4								88
Iowa (100):																										
1914	17	1	5		5	3	1						32	3		2		5								37
1915	23		5			1						1	30	1		1		2			1			1	2	34
1916	22	1	3			1							27	1	1			2			1		1		2	31
1917	27	2	4										33				1	1					1	1	2	36
1918	16		6			2		2				1	27		1	2		3						1	1	31
1919	11		3	1				2					17													17
1920	19	1	3										23	1				1						1	1	25

TABLE 25.—*United States, coal-mine fatalities during the years* **1914** *to* **1920**, *inclusive, by causes and States*—Continued.

State.	Underground.													Shaft.					Surface.						Total by States.	
	Falls of roof (coal, rock, etc.). 1	Falls of face or pillar coal. 2	Mine cars and locomotives. 3	Gas explosions and burning gas. 4	Coal-dust explosions (including gas and dust combined). 5	Explosives. 6	Suffocation from mine gases. 7	Electricity. 8	Animals. 9	Mining machines. 10	Mine fires (burned, suffocated, etc.). 11	Other causes. 12	Total.	Falling down shafts or slopes. 13	Objects falling down shafts or slopes. 14	Cage, skip, or bucket. 15	Other causes. 16	Total.	Mine cars and mine locomotives. 17	Electricity. 18	Machinery. 19	Boiler explosions or bursting steam pipes. 20	Railway cars and locomotives. 21	Other causes. 22	Total.	Grand total.
Kansas (102):																										
1914	14	....	....	....	8	1	....	1	....	....	....	1	25	6	1	....	....	7	....	....	1	....	....	....	1	33
1915	10	....	....	2	4	6	....	....	....	....	....	....	22	....	....	1	....	1	....	....	1	....	....	....	1	24
1916	18	1	....	21	....	8	....	1	....	....	2	....	51	1	....	1	....	2	1	....	....	....	....	....	1	54
1917	17	....	1	3	2	1	1	....	2	....	....	....	27	....	1	1	....	2	....	....	....	....	....	1	1	30
1918	13	....	5	....	4	5	1	....	....	....	....	....	28	....	....	1	....	1	....	....	1	1	....	1	3	32
1919	14	....	....	1	2	1	2	....	....	....	....	1	21	1	1	....	....	2	1	....	....	....	....	1	2	25
1920	11	....	1	3	6	2	....	....	....	....	....	....	23	1	1	....	....	2	....	....	1	....	....	....	1	26
Kentucky (104):																										
1914	30	....	13	....	1	6	....	2	....	1	....	....	53	2	....	....	....	2	2	1	1	....	1	1	6	61
1915	35	3	14	....	....	2	....	5	....	....	....	....	59	1	....	1	....	2	2	....	....	....	....	1	3	64
1916	35	1	14	....	....	4	....	5	....	1	....	1	61	1	1	....	....	2	8	1	....	....	2	1	12	75
1917	29	2	23	62	2	5	....	7	....	....	....	1	131	....	....	....	....	....	8	....	1	1	....	1	11	142
1918	33	2	13	....	....	9	....	5	1	3	2	1	69	....	....	....	....	....	5	1	....	....	....	2	8	77
1919	42	1	14	....	3	6	....	5	....	1	....	....	72	....	....	....	....	....	3	2	....	....	2	5	12	84
1920	67	....	18	2	2	6	....	6	....	3	7	1	112	1	....	....	....	1	1	1	....	....	2	3	7	120
Maryland (106):																										
1914	15	1	1	....	....	....	....	....	....	....	....	....	17	....	....	....	....	....	....	....	1	....	....	....	1	18
1915	5	....	1	....	....	2	....	1	....	....	....	....	9	....	....	....	....	....	....	....	....	....	1	....	1	10
1916	11	2	....	....	16	2	....	....	....	....	....	....	31	....	....	....	....	....	....	....	....	....	....	1	1	32
1917	15	....	4	....	....	....	....	....	....	....	....	....	19	....	....	1	....	1	....	1	....	....	....	....	1	21
1918	8	2	5	....	....	2	....	....	....	....	....	....	17	....	....	....	....	....	....	....	....	....	....	....	....	17
1919	3	....	1	....	....	1	....	....	....	....	....	....	5	....	....	....	....	....	....	....	....	....	....	....	....	5
1920	7	....	....	....	....	....	....	....	....	....	....	....	7	....	....	....	....	....	....	....	....	....	....	....	....	7
Michigan (108):																										
1914	1	....	....	....	....	....	....	....	....	1	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	2
1915	2	....	....	....	....	....	....	1	....	2	....	....	5	1	....	....	....	1	....	....	....	....	1	....	1	7
1916	1	....	....	....	....	1	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	2
1917	....	....	....	....	....	1	....	....	....	....	....	....	1	1	....	....	....	1	....	....	....	....	....	2	2	4

1918	6		2			1							9	1				1	1	1					2	12
1919	2		1										3													3
1920	3		1					1					5											1	1	6
Missouri (110):																										
1914	12		2										14			5		5								19
1915	4			2		6	1	3					16		1			1								17
1916	6												6													6
1917	9					1		1					11													11
1918	8		1	1								1	11	1		1		2								13
1919	5	1		1		1	1						9			1		1								10
1920	6		2			1							9				1	1						1	1	11
Montana (112):																										
1914	6		1										7						1						1	8
1915	7	2	2										11	1				1	1						1	13
1916	8	2	6										16													16
1917	7	2	9	1		1							20		1			1			1			1	2	23
1918	7	4	2					1					14								2		1		3	17
1919	2	2	3	1									8	1		1		2	1						1	11
1920	6	1	4			1		1		1			14													14
New Mexico (114):																										
1914	14		2										16	1				1						1	1	18
1915	13	1	3					2					19													19
1916	12	2	3			2							19													19
1917	11		2			1		1					15	1				1								16
1918	21	2	2		1		1	2					29						1				1		2	31
1919	14	1	5										20							1				4	5	25
1920	10	7	4		5	1		3				1	31						2						2	33
North Dakota (117):																										
1914	1		2										3													3
1915						1							1													1
1916	1												1													1
1917	2												2			1		1								3
1918																										0
1919	2		1										3											1	1	4
1920	1				1			1					3													3
Ohio (119):																										
1914	44	1	10	1		2		1		2		1	62										1	1	2	64
1915	33	8	15			3		4		2		1	66			1		1								67
1916	69		23	1		5		5		1			104			1		1	1				2		3	108
1917	47	17	25	2		4		3		1		1	100	1		3		4			1		1	2	4	108
1918	89	10	22			8	2	2		1		2	133						1		1		4	7	13	149
1919	76	1	19	2		10		3		1	20	1	133		1	1		2	3				2	2	7	142
1920	78	1	25	3		9	3	2		4		2	127	1				1	1				2	3	6	134
Oklahoma (121):																										
1914	20		3	1	1	2		3				1	31													31
1915	5		3	1	2	5							16	1				1		1			1	3	5	22
1916	13		3	2	3	1		2		1			25	1				1								26
1917	10		10	4	5	3		2				1	35		1			1			1				1	37
1918	13		1	6	1	4	1	3					29	1				1			1				1	31
1919	11		5	16	1			3					36													36
1920	7	1	4	17	3	2		6					40						1						1	41

TABLE 25.—*United States, coal-mine fatalities during the years* **1914** *to* **1920**, *inclusive, by causes and States*—Continued.

State.	Underground.													Shaft.					Surface.							Total by States.	
	Falls of roof (coal, rock, etc.). 1	Falls of face or pillar coal. 2	Mine cars and locomotives. 3	Gas explosions and burning gas. 4	Coal-dust explosions (including gas and dust combined). 5	Explosives. 6	Suffocation from mine gases. 7	Electricity. 8	Animals. 9	Mining machines. 10	Mine fires (burned, suffocated, etc.). 11	Other causes. 12	Total.	Falling down shafts or slopes. 13	Objects falling down shafts or slopes. 14	Cage, skip, or bucket. 15	Other causes. 16	Total.	Mine cars and mine locomotives. 17	Electricity. 18	Machinery. 19	Boiler explosions or bursting steam pipes. 20	Railway cars and locomotives. 21	Other causes. 22	Total.	Grand total.
Oregon (123):																											
1914	....	....	....	1	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1
1915	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0
1916	....	....	....	3	....	....	....	....	....	....	....	....	3	....	....	....	....	....	....	....	....	....	....	....	....	3
1917	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0
1918	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0
1919	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0
1920	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....		0
Pennsylvania (bituminous) (127):																										
1914	189	44	89	3	....	7	5	25	1	3	....	10	376	3	....	....	....	3	13	2	3	1	....	4	23	402
1915	204	41	77	30	....	9	....	24	2	5	....	8	400	8	....	....	....	8	10	4	5	....	....	11	30	438
1916	195	28	89	36	....	10	1	23	2	6	....	9	399	9	....	2	....	11	15	....	1	1	....	6	23	433
1917 (revised)	228	36	128	21	....	6	....	16	2	5	....	7	449	1	3	4	....	8	13	....	4	3	8	10	38	495
1918	256	18	112	8	....	6	2	18	1	7	3	5	436	6	1	5	....	12	14	3	3	3	7	13	43	491
1919	188	36	79	10	....	17	....	12	....	9	2	9	362	3	1	2	4	10	9	2	5	....	4	7	27	399
1920	207	27	79	22	....	22	1	9	....	10	....	7	384	2	6	1	....	9	7	3	2	3	7	12	34	427
South Dakota:																										
1914	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0
1915	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0
1916	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0
1917	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0
1918	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0
1919	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0
1920	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0
Tennessee (129):																										
1914	19	2	1	1	....	1	....	....	....	....	....	....	24	....	....	....	....	....	2	....	....	....	....	....	2	26
1915	15	....	4	....	....	3	1	2	....	....	....	....	25	....	....	....	....	....	....	....	....	....	....	....	....	25
1916	1	....	2	....	....	....	....	3	1	....	....	....	15	....	....	....	....	....	....	....	....	....	....	....	....	15
1917	12	....	2	1	11	....	....	1	....	....	....	....	27	....	....	....	....	....	....	....	1	....	....	....	1	28

1918	10	....	3	....	....	....	....	1	....	....	....	....	**14**	....	....	....	....	....	....	....	....	....	....	....	....	**14**
1919	18	....	8	....	....	1	....	....	....	....	....	....	**27**	....	....	....	....	....	....	....	....	....	....	....	....	**27**
1920	13	3	4	1	....	....	....	....	....	....	....	....	**21**	....	....	....	....	....	....	....	....	....	....	....	....	**21**
Texas (131):																										
1914	4	2	1	1	....	1	....	....	....	....	....	1	**10**	1	....	....	....	**1**	....	....	....	....	....	....	....	**11**
1915	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	**1**	....	....	....	....	....	....	....	**1**
1916	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	**2**	....	....	....	....	....	....	....	**2**
1917	....	....	....	....	....	1	....	....	....	....	....	....	**1**	....	....	....	....	....	....	....	....	....	....	....	....	**1**
1918	1	....	....	....	....	....	....	....	....	....	4	....	**5**	....	....	2	....	**2**	....	....	....	....	....	....	....	**7**
1919	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	1	**3**	....	....	....	....	....	....	....	**3**
1920	3	....	....	....	....	1	....	....	....	....	....	....	**4**	....	....	1	....	**1**	....	....	....	....	....	....	....	**5**
Utah (133):																										
1914	9	....	6	....	....	....	....	1	....	1	....	....	**17**	....	....	....	....	....	....	....	2	2	1	....	**5**	**22**
1915	7	1	....	....	....	....	....	1	....	....	1	....	**10**	....	....	....	....	....	....	1	....	....	....	....	**1**	**11**
1916	13	....	5	....	....	1	....	....	....	....	....	1	**20**	....	....	....	....	....	2	1	....	....	....	....	**3**	**23**
1917	8	....	5	1	....	1	....	1	....	....	....	1	**17**	....	....	....	....	....	1	1	....	....	1	2	**5**	**22**
1918	9	....	4	....	....	1	....	....	....	....	....	1	**15**	....	....	....	....	....	....	1	....	....	2	1	**4**	**19**
1919	14	1	4	1	....	1	....	....	....	3	....	....	**24**	....	....	....	....	....	1	....	....	....	1	1	**3**	**27**
1920	11	8	9	....	....	....	1	....	....	1	....	....	**30**	....	....	....	....	....	1	3	....	....	....	....	**4**	**34**
Virginia (135):																										
1914	12	1	1	....	....	....	....	1	....	....	....	....	**15**	1	1	....	....	**2**	5	5	....	....	....	....	**10**	**27**
1915	30	1	8	....	....	2	....	2	....	....	....	3	**46**	....	....	....	....	....	1	1	....	....	....	....	**2**	**48**
1916	36	1	9	....	....	1	....	3	....	1	....	....	**51**	....	....	....	....	....	1	....	....	....	....	1	**2**	**53**
1917	37	1	14	1	....	2	....	3	1	....	....	....	**59**	....	....	....	....	....	1	....	....	....	2	1	**4**	**63**
1918	28	....	8	1	....	3	....	1	....	....	....	....	**41**	....	....	....	....	....	1	....	....	....	....	1	**2**	**43**
1919	7	4	13	....	....	1	....	2	....	1	....	4	**32**	....	....	1	....	**1**	....	....	....	....	....	1	**1**	**34**
1920	5	6	8	3	1	....	....	....	....	....	....	2	**25**	....	....	....	....	....	....	....	1	....	....	....	**1**	**26**
Washington (137):																										
1914	6	2	3	1	....	3	....	1	....	....	....	....	**16**	....	....	....	....	....	1	....	....	....	....	....	**1**	**17**
1915	5	3	1	....	31	....	....	2	....	....	....	1	**43**	....	....	....	....	....	....	....	2	....	....	1	**3**	**46**
1916	5	2	2	2	....	4	....	2	....	....	....	1	**18**	1	....	....	....	**1**	....	....	....	....	....	2	**2**	**21**
1917	3	3	3	....	....	....	1	2	....	....	....	15	**27**	....	....	....	....	....	2	1	....	....	....	....	**3**	**30**
1918	9	3	3	1	12	....	....	1	....	....	....	1	**30**	1	....	....	....	**1**	1	....	1	....	....	....	**2**	**33**
1919	3	....	2	1	....	1	....	1	....	....	....	6	**14**	....	....	....	....	....	2	....	2	....	....	1	**5**	**19**
1920	7	1	5	....	....	....	....	....	....	....	....	3	**16**	....	....	....	....	....	1	1	....	....	....	....	**2**	**18**
West Virginia (139):																										
1914	220	....	73	182	....	5	....	29	2	5	5	3	**524**	2	1	1	....	**4**	9	2	1	1	4	11	**28**	**556**
1915	184	12	72	53	112	6	....	17	....	2	....	2	**460**	2	....	....	....	**2**	20	2	1	3	4	2	**32**	**494**
1916	201	15	74	27	1	3	1	15	....	8	....	2	**347**	....	....	1	....	**1**	9	4	2	....	3	6	**24**	**372**
1917	190	5	81	19	....	6	....	12	....	9	2	1	**325**	1	1	2	....	**4**	20	9	5	....	4	17	**55**	**384**
1918	197	19	111	1	4	14	....	17	1	6	13	1	**384**	....	1	1	....	**2**	33	4	....	....	....	14	**51**	**437**
1919	171	17	63	15	....	6	....	12	....	9	....	2	**295**	....	1	2	....	**3**	20	3	1	1	2	7	**34**	**322**
1920	165	15	66	3	5	12	....	12	....	11	....	....	**289**	1	1	....	....	**2**	15	6	....	....	6	5	**32**	**323**
Wyoming (141):																										
1914	22	5	9	....	....	4	....	1	1	....	1	....	**43**	....	....	....	....	....	5	....	2	1	....	....	**8**	**51**
1915	15	4	1	....	....	2	....	1	....	....	....	....	**23**	....	....	....	....	....	....	....	....	1	1	1	**3**	**26**
1916	14	2	5	....	....	2	....	3	1	2	....	....	**29**	....	....	....	....	....	....	....	....	....	1	....	**1**	**30**
1917	22	5	6	....	....	1	....	1	....	1	....	....	**36**	....	....	....	....	....	....	....	....	....	....	1	**1**	**37**
1918	21	5	8	1	....	1	1	2	....	....	....	....	**39**	....	....	....	....	....	....	....	....	....	....	2	**2**	**41**
1919	19	3	4	3	1	2	....	....	....	....	....	1	**33**	....	....	....	....	....	....	....	....	....	....	....	....	**33**
1920	16	5	10	....	....	....	....	2	....	2	....	....	**35**	....	....	1	....	**1**	1	1	....	....	....	11	**13**	**49**

TABLE 25.—*United States: Coal-mine fatalities during the years* **1914** *to* **1920**, *inclusive, by causes and States*—Continued.

State.	Underground.													Shaft.					Surface.						Total by States.	
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Gas explosions and burning gas.	Coal-dust explosions (including gas and dust combined).	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	Total.	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip, or bucket.	Other causes.	Total.	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes.	Railway cars and locomotives.	Other causes.	Total.	Grand total.
	1	2	3	4	5	6	7	8	9	10	11	12		13	14	15	16		17	18	19	20	21	22		
Total (bituminous):																										
1914	819	84	304	288	17	56	6	86	5	19	7	23	**1,714**	23	5	12	1	**41**	38	10	13	5	13	25	**104**	**1,859**
1915	725	93	267	119	151	76	5	85	2	11	1	18	**1,553**	21	2	7	....	**30**	34	9	15	4	14	24	**100**	**1,683**
1916	782	68	326	127	56	60	2	81	4	20	3	21	**1,553**	20	2	10	2	**34**	38	6	6	3	10	21	**84**	**1,671**
1917	858	107	124	156	163	55	2	76	9	18	2	38	**1,908**	11	8	21	4	**44**	51	13	21	7	26	44	**162**	**2,114**
1918	968	84	440	69	34	85	10	77	6	17	25	24	**1,839**	14	8	16	3	**41**	58	10	10	5	21	45	**149**	**2,029**
1919	774	97	308	102	47	57	5	65	1	26	22	27	**1,531**	13	4	18	5	**40**	42	8	11	2	15	33	**111**	**1,682**
1920	839	93	340	94	34	78	8	70	....	36	8	20	**1,620**	16	8	8	2	**34**	32	15	5	3	21	43	**119**	**1,773**
Pennsylvania (anthracite) (125):																										
1914	166	62	76	44	......	90	8	3	2	1	....	34	**486**	47	....	....	....	**47**	30	1	13	....	....	18	**62**	**595**
1915	194	67	80	34	......	79	11	4	1	1	....	45	**516**	10	....	....	....	**10**	28	1	11	2	....	18	**60**	**583**
1916	180	35	64	43	......	86	10	9	4	....	....	43	**474**	11	....	2	2	**15**	21	1	16	1	6	21	**66**	**555**
1917 (revised)	199	66	64	41	......	55	6	3	....	1	....	32	**467**	10	4	1	1	**16**	23	4	25	1	10	36	**99**	**582**
1918	214	28	66	26	......	50	5	11	2	....	1	39	**442**	7	1	1	2	**11**	29	5	30	2	10	22	**98**	**551**
1919	172	57	73	42	......	149	6	4	1	....	....	42	**546**	7	2	3	1	**13**	29	2	11	4	7	23	**76**	**635**
1920	160	35	65	36	......	49	10	6	4	1	....	25	**391**	11	....	11	....	**22**	22	2	19	1	3	27	**74**	**487**
United States (3):																										
1914	985	146	380	332	17	146	14	89	7	20	7	57	**2,200**	70	5	12	1	**88**	68	11	26	5	13	43	**166**	**2,454**
1915	919	160	347	153	151	155	16	89	3	12	1	63	**2,069**	31	2	7	....	**40**	62	10	26	6	14	42	**160**	**2,269**
1916	962	103	390	170	56	146	12	90	8	20	3	67	**2,027**	31	2	12	4	**49**	59	7	22	4	16	42	**150**	**2,226**
1917 (revised)	1,057	173	188	197	163	110	8	79	9	19	2	70	**2,375**	21	12	23	5	**60**	74	17	46	8	36	80	**261**	**2,696**
1918	1,182	112	506	95	34	135	15	88	8	17	26	63	**2,281**	21	9	17	5	**52**	87	15	40	7	31	67	**247**	**2,580**
1919	946	154	381	114	47	206	11	69	2	26	22	69	**2,077**	20	6	21	6	**53**	71	10	22	6	22	56	**187**	**2,317**
1920	999	128	405	130	34	127	18	76	4	37	8	45	**2,011**	27	8	19	2	**56**	54	17	21	4	24	70	**193**	**2,260**

TABLE 26.—*Percentage of coal mined by various methods, by States and years.*[a]

State and year.	Percentage coal mined by— Hand.	Machine.	Shot off solid.	Not reported.[b]
Alabama:				
1914	32.9	31.7	35.3	0.1
1915	31.0	35.4	33.5	.1
1916	31.3	32.1	36.2	.4
1917	26.6	30.1	42.0	1.3
1918	22.1	31.0	44.3	2.6
Alaska:				
1914[c]	......	......	......	......
1915	......	......	......	......
1916	......	......	......	......
1917	......	......	......	......
1918	......	......	......	......
Arkansas:				
1914	2.9	19.1	77.9	.1
1915	.4	23.7	75.4	.5
1916	6.7	11.2	81.6	.5
1917	7.2	7.2	84.8	.8
1918	6.3	10.9	77.6	5.2
California, Idaho, and Nevada:				
1914	......	......	......	......
1915	......	......	......	......
1916	......	......	......	......
1917	......	......	......	......
1918	......	......	......	......
Colorado:				
1914	57.3	30.6	11.6	.5
1915	57.8	30.5	11.3	.4
1916	51.4	31.9	16.1	.6
1917	59.0	32.7	7.6	.7
1918	54.0	36.9	7.3	1.8
Georgia and North Carolina:				
1914	......	......	100.0	......
1915	4.2	......	95.8	......
1916	3.5	......	96.5	......
1917	1.4	......	98.6	......
1918	2.6	......	97.4	......
Illinois:				
1914	10.4	56.7	31.9	1.0
1915	11.0	61.2	26.5	1.3
1916	11.0	61.7	26.2	1.1
1917	9.9	56.3	32.8	1.0
1918	9.5	56.6	33.1	.8
Indiana:				
1914	10.6	56.2	29.9	3.3
1915	12.9	58.4	24.2	4.5
1916	9.1	56.6	29.4	4.9
1917	8.1	54.1	32.5	5.3
1918	11.5	49.0	34.3	5.2
Iowa:				
1914	19.5	4.1	74.4	2.0
1915	19.0	5.5	74.4	1.1
1916	17.0	8.8	73.0	1.2
1917	21.8	11.4	65.9	.9
1918	27.9	10.7	58.5	2.9
Kansas:				
1914	16.4	.6	76.9	6.1
1915	7.1	.6	80.5	11.8
1916	8.5	.6	78.0	12.9
1917	21.1	.5	66.8	11.6
1918	6.2	.7	77.4	15.7
Kentucky:				
1914	9.8	77.2	11.6	1.4
1915	6.8	81.8	10.6	.8
1916	6.0	84.4	9.0	.6
1917	5.2	83.6	10.8	.4
1918	4.3	78.5	15.1	2.1
Maryland:				
1914	93.4	2.7	3.0	0.9
1915	90.4	5.4	3.7	.5
1916	89.3	5.0	5.1	.6
1917	73.9	6.1	18.6	1.4
1918	72.6	6.7	17.5	3.2
Michigan:				
1914	.2	77.8	21.9	.1
1915	3.0	84.2	12.8	......
1916	2.2	88.5	9.1	.2
1917	3.4	87.3	9.2	.1
1918	.9	86.8	9.7	2.6
Missouri:				
1914	22.2	19.0	46.6	12.2
1915	21.2	22.6	34.9	21.3
1916	19.4	20.0	34.6	26.0
1917	19.4	19.9	36.7	24.0
1918	16.5	22.0	36.2	25.3
Montana:				
1914	24.2	43.3	31.9	.6
1915	23.0	55.0	21.0	1.0
1916	34.1	55.7	9.5	.7
1917	35.4	49.0	14.3	1.3
1918	21.2	50.0	28.2	.6
New Mexico:				
1914	65.0	16.0	18.8	.2
1915	79.7	16.9	3.1	.3
1916	81.7	13.5	4.5	.3
1917	68.2	26.3	5.2	.3
1918	59.8	30.7	9.0	.5
North Dakota:				
1914	6.3	41.1	38.2	14.4
1915	4.6	38.6	40.1	16.7
1916	6.3	34.4	43.8	15.5
1917	6.2	38.0	42.9	12.9
1918	4.7	47.9	35.2	12.2
Ohio:				
1914	6.7	85.7	3.8	3.8
1915	4.2	89.2	2.8	3.8
1916	3.7	91.1	2.1	3.1
1917	4.0	87.9	3.3	4.8
1918	3.2	84.8	3.7	8.3
Oklahoma:				
1914	2.0	26.4	70.7	.9
1915	3.2	30.4	65.2	1.2
1916	1.4	34.8	60.6	3.2
1917	.5	36.6	59.0	3.9
1918	3.9	39.5	52.3	4.3
Oregon:				
1914	......	......	......	......
1915	......	......	......	......
1916	......	......	......	......
1917	......	......	......	......
1918	......	......	......	......
Pennsylvania, bituminous:				
1914	37.2	53.8	2.0	7.0
1915	34.5	55.6	9.7	.2
1916	35.0	55.4	9.3	.3
1917	36.8	55.4	7.2	.6
1918	35.7	55.0	6.9	2.4
South Dakota:				
1914	......	......	......	......
1915	......	......	......	......
1916	......	......	......	......
1917	......	......	......	......
1918	......	......	......	......

[a] Compiled from Mineral Resources, U. S. Geol. Survey.
[b] Since 1915 includes coal mined from steam-shovel pits.
[c] Less than one-tenth of 1 per cent.

TABLE 23.—*Percentage of coal mined by various methods, by State and years*—Contd.

State and year.	Percentage coal mined by—			
	Hand.	Machine.	Shot off solid.	Not reported.[b]
Tennessee:				
1914	39.1	23.2	37.6	0.1
1915	39.1	26.3	34.5	.1
1916	33.9	24.7	41.1	.3
1917	32.7	22.6	44.5	.2
1918	26.8	22.7	48.1	2.4
Texas:				
1914	72.5	1.2	26.3	......
1915	76.4	1.6	22.0	......
1916	78.0	1.0	21.0	......
1917	79.6	.1	20.3	......
1918	76.0	.1	21.5	2.4
Utah:				
1914	63.6	30.4	5.9	.1
1915	47.3	49.6	2.9	.2
1916	41.7	57.5	.8	......
1917	37.7	54.8	7.4	.1
1918	36.7	53.9	9.2	.2
Virginia:				
1914	18.0	51.4	30.5	.1
1915	2.9	63.2	33.9	(c)
1916	4.4	61.9	33.7	......
1917	3.7	63.9	32.3	.1
1918	14.9	62.2	19.7	3.2
Washington:				
1914	41.8	10.7	47.1	.4
1915	42.7	12.8	44.5	......
1916	58.2	9.1	32.7	......
1917	59.7	5.8	34.5	......
1918	57.8	6.1	36.1	......
West Virginia:				
1914	40.4	58.9	0.5	0.2
1915	39.3	60.0	.6	.1
1916	36.5	62.9	.5	.1
1917	33.5	64.8	1.5	.2
1918	29.0	67.5	2.8	.7
Wyoming:				
1914	23.7	42.2	34.0	.1
1915	21.9	44.6	33.4	.1
1916	22.8	44.0	33.1	.1
1917	16.0	41.9	42.0	.1
1918	21.6	47.3	29.7	1.4
Total (bituminous):				
1914	29.7	51.7	15.3	3.3
1915	28.0	55.0	15.9	1.1
1916	26.8	56.4	15.5	1.3
1917	25.6	55.5	17.3	1.6
1918	23.8	55.9	17.5	2.8
Pennsylvania, anthracite:				
1914	......	......	......	......
1915	......	......	......	......
1916	......	2.1	......	2.3
1917	......	2.0	......	2.3
1918	......	1.9	......	2.4
United States:				
1914	29.7	51.7	15.3	3.3
1915	28.0	55.0	15.9	1.1
1916	26.8	56.4	15.5	1.3
1917	......	47.3	......	1.7
1918	......	48.0	......	2.8

[b] Since 1915 includes coal mined from steam-shovel pits.

[c] Less than one-tenth of 1 per cent.

DATA ESSENTIAL TO DETERMINE TRUE ACCIDENT RATES.

The lack of complete and comparable statistics regarding accidents at coal mines has for many years been apparent to those who have had occasion to examine existing records.

Perhaps the simplest explanation of this want of essential data is that so many factors have a bearing upon the frequency of accidents that many of such factors have been thoughtlessly overlooked or perhaps omitted because of the great volume of work which their presentation would involve. It has therefore become customary to indicate the hazards of mining by presenting figures showing the number of accidents in proportion to the quantity of coal produced or the actual number of men employed. Accident rates based upon these two factors alone are likely to prove misleading.

It is of course impossible to adequately represent by figures the real hazards of mining. Any statistical portrayal is *per se* incomplete. But it is entirely feasible to present in a single publication considerable pertinent data which are often omitted from statistical publications relating to mine accidents. Prominent among these are the average number of days the mines were active and the number of days of labor performed by the employees. These two factors are required in order to calculate accident rates based upon a uniform number of working days; that is, a standard period of exposure to occupational hazards. When such uniform rates are obtained they may be more intelligently interpreted if we know how the daily output of the individual worker varies in different years or in different States. Again, the average daily production of coal per man is affected largely by the extent to which mining machines are used.

In view of the foregoing, it is manifest that any statistical report on mine accidents is complete or incomplete to the degree to which such collateral figures are included or omitted.

In Tables 30 to 59, covering the period 1911 to 1918, effort has been made to place in compact and convenient form such basic and pertinent data as are available. For this purpose the writer acknowledges his indebtedness to the United States Geological Survey whose reports have been freely drawn upon for data as to production, number of employees, days active, etc. Reference to such tables is essential to the proper interpretation of the accident rates herein presented.

FATALITY RATES ON A 2,000-HOUR BASIS.

Tables 27 and 28, showing the number of men killed per thousand 2,000-hour workers, are based upon reports of the United States Geological Survey showing the number of coal-mine employees who work 8, 9, or 10 hours a day.

Any rates purporting to indicate the relative frequency of accidents at mines in different States or in different years should, as previously stated, be calculated upon the basis of a uniform working time. It is a common practice, although obviously incorrect, to compare the fatality rate for one State where all employees work, say, an average of 300 days each during a given year with the rate for another State where the employees (because of labor troubles or for other reasons), average, perhaps, 150 days during the same year. It is likewise incorrect (although perhaps necessary) to make comparisons between the accident rates of two States when, in one case, all mines are operated on an 8-hour basis while in the other case the 10-hour day is still in vogue.

The actual number of hours during which mine employees in the United States are exposed to the hazards of their occupation is, unfortunately, not available. Therefore, in Tables 27 and 28 the rates are based upon the number of hours the mines were in operation and the employees were presumably at liberty to work rather than the number of hours the men actually worked. The rates presented are perhaps the best that can be obtained for the country as a whole in view of the state of existing records.

In connection with these tables, attention is called to Tables 44 to 46 wherein the accident rates are given on a basis of 300 days to the working year regardless of the number of hours constituting a day's work. The accident rates on a 300-day basis will make it possible to compare fatal accidents at coal mines with similar accidents at metal mines, quarries, and in other branches of the mineral industry.

NUMBER OF 8, 9, AND 10 HOUR EMPLOYEES IN COAL MINES.

Table 29 shows the number of 8, 9, or 10 hour employees in the coal mines of the United States for the years 1914 to 1918. Later figures are not available. The figures in this table form the basis of the fatality rates presented in Tables 27 and 28.

TABLE 27.—*Men employed, hours worked, and fatality rates, at coal mines, during the years ended Dec. 31, 1915 and 1916.*[a]

State.	Men employed.	Average days worked.	Total hours worked (all employees).		Number of 2,000-hour workers.	Fatalities.	
			Per day.	Per year.		Total.	Per 1,000-2,000-hour workers.
	1	2	3	4	5	6	7
			1915.				
Alabama	22,591	223	220,059	49,073,157	24,537	63	2.57
Alaska (not reported)	....	....	....	....	....	....	....
Arkansas	3,751	149	30,170	4,495,330	2,248	8	3.56
California, Idaho, and Nevada	36	285	324	92,340	46	0	....
Colorado	12,372	194	99,089	19,223,266	9,612	63	6.55
Georgia and North Carolina	368	197	3,312	652,464	326	0	....
Illinois	75,610	179	605,871	108,450,909	54,225	136	2.51
Indiana	22,777	179	182,698	32,702,942	16,351	46	2.81
Iowa	15,549	220	124,633	27,419,260	13,710	34	2.48
Kansas	13,260	184	106,470	19,590,480	9,795	24	2.45
Kentucky	27,960	186	261,184	48,580,224	24,290	64	2.63
Maryland	5,664	242	56,088	13,573,296	6,787	10	1.47
Michigan	2,569	198	20,552	4,069,296	2,035	7	3.44
Missouri	9,173	186	73,689	13,706,154	6,853	17	2.48
Montana	3,158	201	25,314	5,088,114	2,544	13	5.11
New Mexico	4,205	262	33,811	8,858,482	4,429	19	4.29
North Dakota	590	219	5,705	1,249,395	625	1	1.60
Ohio	40,053	142	322,087	45,736,354	22,868	67	2.93
Oklahoma	8,457	167	68,329	11,410,943	5,705	22	3.86
Oregon	151	206	1,267	261,002	131	0	....
Pennsylvania (bituminous)	174,593	226	1,520,984	343,742,384	171,871	438	2.55
South Dakota	35	155	315	48,825	24	0	....
Tennessee	8,948	220	82,997	18,259,340	9,130	25	2.74
Texas	5,087	233	44,306	10,323,298	5,162	1	.19
Utah	3,564	208	28,520	5,932,160	2,966	11	3.71
Virginia	8,959	235	89,390	21,006,650	10,503	48	4.57
Washington	4,850	169	38,841	6,564,129	3,282	46	14.02
West Virginia	75,882	208	715,093	148,739,344	74,370	494	6.64
Wyoming	7,244	201	57,966	11,651,166	5,826	26	4.46
Total (bituminous) [b]	**557,456**	**203**	**4,819,064**	**977,467,939**	**488,734**	**1,683**	3.44
Pennsylvania (anthracite)	176,552	230	1,588,968	365,462,640	182,731	586	3.21
Total, 1915 [b]	**734,008**	**209**	**6,408,032**	**1,339,278,688**	**669,639**	**2,269**	3.39
			1916.				
Alabama	25,308	262	247,842	64,934,604	32,467	119	3.67
Alaska	83	179	747	133,713	67	0	....
Arkansas	3,772	184	30,320	5,578,880	2,789	7	2.51
California, Idaho, and Nevada	18	188	162	30,456	15	0	....
Colorado	13,104	233	105,396	24,557,268	12,279	43	3.50
Georgia and North Carolina	411	280	3,699	1,035,720	518	1	1.93
Illinois	75,538	198	605,143	119,818,314	59,909	128	2.14
Indiana	23,965	187	192,859	36,064,633	18,032	51	2.83
Iowa	14,443	202	116,429	23,518,658	11,759	31	2.64
Kansas	12,132	204	97,666	19,923,864	9,962	54	5.42
Kentucky	31,222	208	291,957	60,727,056	30,364	75	2.47
Maryland	5,633	256	56,084	14,357,504	7,179	32	4.46
Michigan	2,535	216	20,280	4,380,480	2,190	2	.91
Missouri	9,654	207	77,638	16,071,066	8,036	6	.75
Montana	3,781	244	30,253	7,381,732	3,691	16	4.33
New Mexico	4,522	292	37,810	11,040,520	5,520	19	3.44
North Dakota	714	244	6,893	1,681,892	841	1	1.19
Ohio	41,394	197	332,524	65,507,228	32,754	108	3.30
Oklahoma	7,800	178	62,760	11,171,280	5,586	26	4.65
Oregon	106	236	895	211,220	106	3	28.30
Pennsylvania (bituminous)	168,212	259	1,466,582	379,844,738	189,922	433	2.28
South Dakota	38	145	342	49,590	25	0	....
Tennessee	9,211	239	86,044	20,564,516	10,282	15	1.46
Texas	4,481	218	38,916	8,483,688	4,242	2	.47
Utah	3,129	228	25,110	5,725,080	2,863	23	8.03
Virginia	9,777	272	97,482	26,515,104	13,258	53	4.00
Washington	4,797	217	38,380	8,328,460	4,164	21	5.04
West Virginia	78,067	237	734,532	174,084,084	87,042	372	4.27
Wyoming	7,255	248	58,413	14,486,424	7,243	30	4.14
Total (bituminous) [b]	**561,102**	**230**	**4,863,158**	**1,117,387,840**	**558,694**	**1,671**	2.99
Pennsylvania (anthracite)	159,869	253	1,318,919	333,686,507	166,843	555	3.33
Total, 1916 [b]	**720,971**	**235**	**6,182,077**	**1,452,788,095**	**726,394**	**2,226**	3.06

[a] Compiled (except for fatalities) from Mineral Resources, U. S. Geological Survey.

[b] Totals in columns 4 and 5 obtained by calculating averages for United States, and not by adding corresponding figures for each State.

TABLE 28.—*Men employed, hours worked, and fatality rates at coal mines during the years ended Dec. 31, **1917** and **1918**.*[a]

1917.

State.	Men employed.	Average days worked.	Total hours worked (all employees).		Number of 2,000-hour workers.	**Fatalities.**	
			Per day.	Per year.		**Total.**	**Per 1,000 2,000-hour workers.**
	1	2	3	4	5	6	7
Alabama	28,386	273	272,654	74,434,542	37,217	**108**	**2.90**
Alaska							
Arkansas	3,998	187	32,349	6,049,263	3,025	**17**	**5.62**
California, Idaho, and Nevada	17	173	153	26,469	13		
Colorado	14,231	263	115,841	30,466,183	15,233	**188**	**12.34**
Georgia and North Carolina	281	269	2,529	680,301	340	**1**	**2.94**
Illinois	84,090	243	674,375	163,873,125	81,937	**233**	**2.84**
Indiana	26,528	221	214,458	47,395,218	23,698	**76**	**3.21**
Iowa	14,266	251	115,066	28,881,566	14,441	**36**	**2.49**
Kansas	10,680	216	85,976	18,570,816	9,285	**30**	**3.23**
Kentucky	34,926	214	301,429	64,505,806	32,253	**142**	**4.40**
Maryland	5,919	254	48,864	12,411,456	6,206	**21**	**3.38**
Michigan	2,406	254	19,279	4,896,866	2,448	**4**	**1.63**
Missouri	9,668	240	77,896	18,695,040	9,348	**11**	**1.18**
Montana	4,149	268	33,236	8,907,248	4,454	**23**	**5.16**
New Mexico	4,126	321	34,517	11,079,957	5,540	**16**	**2.89**
North Dakota	821	255	7,600	1,938,000	969	**3**	**3.10**
Ohio	45,509	210	366,639	76,994,190	38,497	**108**	**2.81**
Oklahoma	8,495	211	68,621	14,479,031	7,240	**37**	**5.11**
Oregon	104	251	866	217,366	109		
Pennsylvania (bituminous)	173,968	261	1,447,023	377,673,003	188,837	**495**	**2.62**
South Dakota	34	154	306	47,124	24		
Tennessee	10,421	241	92,698	22,340,218	11,170	**28**	**2.51**
Texas	4,375	263	38,108	10,022,404	5,011	**1**	**.20**
Utah	3,485	219	27,948	6,120,612	3,060	**22**	**7.19**
Virginia	11,168	273	103,188	28,170,324	14,085	**63**	**4.47**
Washington	5,312	271	42,723	11,577,933	5,789	**30**	**5.18**
West Virginia	88,422	225	761,725	171,388,125	85,694	**384**	**4.48**
Wyoming	7,358	246	58,882	14,484,972	7,242	**37**	**5.11**
Total (bituminous) [b]	**603,143**	**243**	**5,044,949**	**1,225,922,607**	**612,961**	**2,114**	**3.45**
Pennsylvania (anthracite)	154,174	285	1,233,392	351,516,720	175,758	**582**	**3.31**
Total, 1917 [b]	**757,317**	**251**	**6,278,341**	**1,575,863,591**	**787,932**	**2,696**	**3.42**

1918.

State.	Men employed.	Average days worked.	Total hours worked (all employees).		Number of 2,000-hour workers.	**Fatalities.**	
			Per day.	Per year.		**Total.**	**Per 1,000 2,000-hour workers.**
Alabama	26,221	278	212,732	59,139,496	29,570	**110**	**3.72**
Alaska	239	254	2,151	546,354	273		
Arkansas	3,978	204	32,399	6,609,396	3,305	**13**	**3.93**
California, Idaho, and Nevada	15	240	135	32,400	16		
Colorado	14,483	255	116,608	29,735,040	14,868	**71**	**4.78**
Georgia and North Carolina	240	212	2,160	457,920	229	**2**	**8.73**
Illinois	85,965	238	688,365	163,830,870	81,915	**238**	**2.91**
Indiana	30,376	227	244,772	55,563,244	27,782	**100**	**3.60**
Iowa	13,328	245	107,710	26,388,950	13,194	**31**	**2.35**
Kansas	10,665	234	86,313	20,197,242	10,099	**32**	**3.17**
Kentucky	39,342	230	331,840	76,323,200	38,162	**77**	**2.02**
Maryland	5,568	261	44,778	11,687,058	5,844	**17**	**2.91**
Michigan	2,558	237	20,496	4,857,552	2,429	**12**	**4.94**
Missouri	9,590	235	77,656	18,249,160	9,125	**13**	**1.42**
Montana	4,559	264	36,569	9,654,216	4,827	**17**	**3.52**
New Mexico	4,095	301	32,832	9,882,432	4,941	**31**	**6.27**
North Dakota	828	229	7,130	1,632,770	816		
Ohio	48,450	223	390,511	87,083,953	43,542	**149**	**3.42**
Oklahoma	8,451	228	68,292	15,570,576	7,785	**31**	**3.98**
Oregon	40	292	330	96,360	48		
Pennsylvania (bituminous)	174,306	269	1,421,366	382,347,454	191,174	**491**	**2.57**
South Dakota	21	145	189	27,405	14		
Tennessee	10,694	265	88,715	23,509,475	11,755	**14**	**1.19**
Texas	3,936	262	33,927	8,888,874	4,444	**7**	**1.58**
Utah	4,160	258	33,329	8,598,882	4,299	**19**	**4.42**
Virginia	11,004	277	90,634	25,105,618	12,553	**43**	**3.43**
Washington	5,109	275	40,911	11,250,525	5,625	**33**	**5.87**
West Virginia	89,530	238	750,373	178,588,774	89,294	**437**	**4.89**
Wyoming	7,554	268	60,792	16,292,256	8,146	**41**	**5.03**
Total (bituminous) [b]	**615,305**	**249**	**5,024,015**	**1,250,979,735**	**625,490**	**2,029**	**3.24**
Pennsylvania (anthracite)	147,121	293	1,176,968	344,851,624	172,426	**551**	**3.20**
Total, 1918 [b]	**762,426**	**258**	**6,200,983**	**1,599,853,614**	**799,927**	**2,580**	**3.23**

[a] Compiled (except for fatalities) from Mineral Resources, U. S. Geological Survey.

[b] Totals in columns 4 and 5 obtained by calculating averages for United States, and not by adding corresponding figures for each State.

Table 29.—*Number of hours to the working day, in and about the coal mines in the United States, by States, for the years **1914** to **1918**, inclusive.*

[Compiled from Mineral Resources, U. S. Geological Survey.]

Year.	8-hour day.		9-hour day.		10-hour day.		Men employed other than 8, 9, or 10 hours per day.	Total number of men employed.
	Number of mines.	Men employed.	Number of mines.	Men employed.	Number of mines.	Men employed.		
Alabama:								
1914	14	646	24	3,546	150	18,115	1,735	21,042
1915	13	369	44	4,402	133	17,109	711	22,591
1916	9	306	40	2,724	132	20,376	1,902	25,308
1917	38	3,586	27	1,900	143	20,766	2,134	28,386
1918	235	24,129	3	72	8	872	1,148	26,221
Alaska:								
1914	....	....	....	....	....	....	43	[a] 43
1915	....	....	....	....	....	....	36	[a] 36
1916	....	....	....	....	....	....	....	83
1917 [b]	....	....	....	....	....	....	....	....
1918	....	....	....	....	....	....	....	....
Arkansas:								
1914	53	4,314	....	....	....	....	25	4,339
1915	58	3,589	....	....	....	....	162	3,751
1916	60	3,628	....	....	....	....	144	3,772
1917	68	3,636	1	5	1	3	354	3,998
1918	74	3,416	1	8	1	13	541	3,978
California, Idaho, and Nevada:								
1914	....	....	....	....	....	....	....	(c)
1915	....	....	....	....	....	....	....	(c)
1916	....	....	....	....	....	....	....	18
1917	....	....	....	....	....	....	17	17
1918	....	....	....	....	....	....	15	15
Colorado:								
1914	137	9,496	1	198	1	55	349	10,098
1915	153	12,259	1	2	....	....	111	12,372
1916	159	12,542	....	....	1	2	560	13,104
1917	130	12,238	....	....	....	....	1,993	14,231
1918	169	13,741	1	99	1	2	641	14,483
Georgia and North Carolina:								
1914	....	....	....	....	....	....	355	355
1915	....	....	....	....	....	....	368	368
1916	....	....	....	....	....	....	....	411
1917	....	....	....	....	....	....	281	281
1918	....	....	....	....	....	....	240	240
Illinois:								
1914	455	78,672	9	99	....	....	728	79,499
1915	416	74,619	6	32	....	....	959	75,610
1916	437	74,702	8	56	1	3	777	75,538
1917	402	82,435	4	50	....	....	1,605	84,090
1918	454	85,320	3	33	....	....	612	85,965
Indiana:								
1914	193	21,172	3	14	1	85	1,904	23,175
1915	193	22,364	4	12	7	69	332	22,777
1916	184	22,932	2	39	6	106	888	23,965
1917	181	24,294	2	42	....	....	2,192	26,528
1918	255	28,612	1	15	....	....	1,749	30,376
Iowa:								
1914	175	15,514	2	8	1	4	531	16,057
1915	167	15,308	3	24	....	....	217	15,549
1916	160	13,574	3	22	1	16	831	14,443
1917	130	13,328	1	11	....	....	927	14,266
1918	125	12,242	1	12	....	....	1,074	13,328
Kansas:								
1914	121	12,240	....	....	....	....	208	12,448
1915	134	12,870	....	....	....	....	390	13,260
1916	131	11,522	....	....	....	....	610	12,132
1917	120	10,144	....	....	....	....	536	10,680
1918	141	9,672	....	....	....	....	993	10,665
Kentucky:								
1914	63	5,438	64	5,856	206	17,120	350	28,764
1915	58	5,249	75	7,325	188	14,793	593	27,960
1916	62	5,486	87	6,736	183	16,355	2,645	31,222
1917	217	16,738	84	5,488	69	3,833	8,867	34,926
1918	376	26,601	93	5,271	55	4,363	3,107	39,342

[a] Includes Idaho and Nevada. [b] Included in California and Idaho. [c] Included in Alaska.

TABLE 29.—*Number of hours to the working day, in and about the coal mines in the United States, by States, for the years **1914** to **1918**, inclusive*—Continued.

Year.	8-hour day.		9-hour day.		10-hour day.		Men employed other than 8, 9, or 10 hours per day.	Total number of men employed.
	Number of mines.	Men employed.	Number of mines.	Men employed.	Number of mines.	Men employed.		
Maryland:								
1914	5	55	1	17	51	5,261	70	5,403
1915	5	142	2	8	48	5,254	260	5,664
1916	1	3	10	205	58	5,390	35	5,633
1917	61	4,766	1	25	5	359	769	5,919
1918	85	5,334	....	....	....	....	234	5,568
Michigan:								
1914	15	2,070	....	....	....	....	730	2,800
1915	17	2,569	....	....	....	....	....	2,569
1916	16	2,535	....	....	....	....	....	2,535
1917	19	2,375	....	....	....	....	31	2,406
1918	21	2,526	....	....	....	....	32	2,558
Missouri:								
1914	165	9,366	2	23	2	33	127	9,549
1915	161	8,906	2	53	2	38	176	9,173
1916	158	9,340	1	6	4	92	216	9,654
1917	130	9,141	1	10	1	25	492	9,668
1918	149	8,685	5	99	2	31	775	9,590
Montana:								
1914	49	3,193	....	....	....	....	157	3,350
1915	36	3,108	....	....	....	....	50	3,158
1916	41	3,776	....	....	....	....	5	3,781
1917	34	4,105	....	....	....	....	44	4,149
1918	44	4,470	....	....	2	8	81	4,559
New Mexico:								
1914	27	3,794	3	363	2	9	12	4,178
1915	35	4,042	2	146	1	8	9	4,205
1916	24	2,890	2	48	1	2	1,582	4,522
1917	26	2,617	....	....	....	....	1,509	4,126
1918	32	4,023	1	34	....	....	38	4,095
North Dakota:								
1914	14	51	10	91	20	403	13	558
1915	19	76	7	27	17	471	16	590
1916	17	87	5	41	17	554	32	714
1917	10	109	2	30	15	320	362	821
1918	16	464	1	15	9	142	207	828
Ohio:								
1914	531	43,718	11	189	3	19	1,475	45,401
1915	500	38,410	19	287	3	20	1,336	40,053
1916	521	40,052	20	327	4	30	985	41,394
1917	489	43,423	7	82	9	481	1,523	45,509
1918	635	46,184	9	242	15	645	1,379	48,450
Oklahoma:								
1914	82	7,806	....	....	2	74	198	8,078
1915	88	7,833	....	....	2	49	575	8,457
1916	95	7,521	....	....	3	81	198	7,800
1917	98	7,890	....	....	2	56	549	8,495
1918	109	7,777	2	109	1	10	555	8,451
Oregon:								
1914	4	169	....	....	....	....	21	190
1915	3	92	....	....	....	....	59	151
1916	4	59	....	....	....	....	47	106
1917	5	70	....	....	....	....	34	104
1918	....	....	....	....	....	....	....	....
Pennsylvania, bituminous:								
1914	819	103,291	291	32,293	263	44,643	3,974	184,201
1915	779	90,999	278	40,159	275	40,646	2,789	174,593
1916	828	84,794	338	38,436	299	37,468	7,514	168,212
1917	1,293	124,824	230	27,293	79	6,135	15,716	173,968
1918	1,698	151,586	146	7,439	52	4,198	11,083	174,306
South Dakota:								
1914	....	....	....	....	....	....	47	47
1915	....	....	....	....	....	....	35	35
1916	....	....	....	....	....	....	....	38
1917	....	....	....	....	....	....	34	34
1918	....	....	....	....	....	....	21	21
Tennessee:								
1914	7	280	77	6,612	33	3,166	58	10,116
1915	4	229	61	5,412	28	2,694	613	8,948
1916	2	51	60	5,110	24	3,196	854	9,211
1917	51	2,630	59	5,748	8	1,539	504	10,421
1918	109	8,380	5	422	2	849	1,043	10,694

TABLE 29.—*Number of hours to the working day, in and about the coal mines in the United States, by States, for the years* ***1914*** *to* ***1918****, inclusive*—Continued.

Year.	8-hour day.		9-hour day.		10-hour day.		Men employed other than 8, 9, or 10 hours per day.	Total number of men employed.
	Number of mines.	Men employed.	Number of mines.	Men employed.	Number of mines.	Men employed.		
Texas:								
1914	25	2,707	2	160	17	1,229	539	4,635
1915	19	2,935	8	301	16	1,458	393	5,087
1916	22	2,566	13	762	12	1,153	....	4,481
1917	13	2,213	16	930	12	946	286	4,375
1918	16	2,074	15	855	6	577	430	3,936
Utah:								
1914	22	4,112	....	....	....	....	....	4,112
1915	21	3,556	....	....	....	....	8	3,564
1916	20	3,051	1	3	....	....	75	3,129
1917	20	3,417	1	6	....	....	62	3,485
1918	26	4,111	1	5	....	....	44	4,160
Virginia:								
1914	3	109	11	1,276	49	7,798	....	9,183
1915	....	....	8	200	56	8,759	....	8,959
1916	3	47	8	107	56	9,536	87	9,777
1917	27	1,484	17	1,141	39	4,160	4,383	11,168
1918	84	8,916	16	1,034	8	514	540	11,004
Washington:								
1914	53	5,751	....	....	1	34	20	5,805
1915	52	4,809	....	....	....	....	41	4,850
1916	44	4,793	....	....	....	....	4	4,797
1917	47	5,085	....	....	....	....	227	5,312
1918	51	5,070	....	....	....	....	39	5,109
West Virginia:								
1914	35	3,144	394	36,612	361	37,826	1,381	78,963
1915	39	3,741	389	34,446	371	35,896	1,799	75,882
1916	35	2,994	426	38,997	371	34,923	1,153	78,067
1917	601	41,199	244	25,552	99	7,126	14,545	88,422
1918	915	58,782	263	23,540	54	3,385	3,823	89,530
Wyoming:								
1914	53	7,706	....	....	1	2	409	8,117
1915	48	7,234	1	2	1	4	4	7,244
1916	48	6,882	....	....	....	....	373	7,255
1917	52	7,349	....	....	1	9	....	7,358
1918	51	7,194	....	....	....	....	360	7,554
Total bituminous:								
1914	3,120	344,814	905	87,357	1,164	135,876	15,459	583,506
1915	3,018	325,308	910	92,838	1,148	127,268	12,042	557,456
1916	3,081	316,133	1,024	93,619	1,173	129,283	22,067	561,102
1917	4,262	429,096	697	68,313	483	45,758	59,976	603,143
1918	5,871	529,339	567	39,304	216	15,609	31,053	615,305
Pennsylvania, anthracite: [a]								
1914	....	....	....	....	....	....	179,679	179,679
1915	....	....	....	....	....	....	176,552	176,552
1916	....	159,869	....	....	....	....	....	159,869
1917	....	154,174	....	....	....	....	....	154,174
1918	....	147,121	....	....	....	....	....	147,121
Total, United States:								
1914	....	344,814	....	87,357	....	135,876	195,138	763,185
1915	....	325,308	....	92,838	....	127,268	188,594	734,008
1916	....	476,002	....	93,619	....	129,283	22,067	720,971
1917	....	583,270	....	68,313	....	45,758	59,976	757,317
1918	....	676,460	....	39,304	....	15,600	31,053	762,426

[a] Employees not segregated. Prior to May, 1916, operations were not conducted on basis of a 9-hour day. Since then the 8-hour day is standard. Number of mines not given.

TABLE 30.—*United States: Production of coal during the years ended Dec. 31, **1911** to **1920**.*[a]

[In net tons.]

State.	1911	1912	1913	1914	1915	1916	1917	1918	1919 [b]	1920 [b]
Alabama	15,021,421	16,100,600	17,678,522	15,593,422	14,927,937	18,086,197	20,068,074	19,184,962	15,230,000	16,700,000
Alaska	900	355	2,300	(c)	1,400	13,073	53,955	75,606	61,000	68,000
Arkansas	2,106,789	2,100,819	2,234,107	1,836,540	1,652,106	1,994,915	2,143,579	2,227,369	1,680,000	2,310,000
California, Idaho, and Nevada	12,568	13,942	26,788	13,974	12,503	7,240	6,423	6,400	5,300	8,000
Colorado	10,157,383	10,977,824	9,232,510	8,170,559	8,624,980	10,484,237	12,483,336	12,407,571	10,100,000	12,100,000
Georgia and North Carolina	165,330	227,703	255,626	166,498	134,496	173,554	119,028	68,136	65,000	89,000
Illinois	53,679,118	59,885,226	61,618,744	57,589,197	58,829,576	66,195,336	86,199,387	89,291,105	64,600,000	90,050,000
Indiana	14,201,355	15,285,718	17,165,671	16,641,132	17,006,152	20,093,528	26,539,329	30,678,634	20,500,000	30,420,000
Iowa	7,331,648	7,289,529	7,525,936	7,451,022	7,614,143	7,260,800	8,965,830	8,192,195	6,300,000	9,170,000
Kansas	6,178,728	6,986,182	7,202,210	6,860,988	6,824,474	6,881,455	7,184,975	7,561,947	5,750,000	6,790,000
Kentucky	14,049,703	16,490,521	19,616,600	20,382,763	21,361,674	25,393,997	27,807,971	31,612,617	28,500,000	31,000,000
Maryland	4,685,795	4,964,038	4,779,839	4,133,547	4,180,477	4,460,046	4,745,924	4,497,297	2,970,000	4,050,000
Michigan	1,476,074	1,206,230	1,231,786	1,283,030	1,156,138	1,180,360	1,374,805	1,464,818	930,000	1,440,000
Missouri	3,836,107	4,339,856	4,318,125	3,935,980	3,811,593	4,742,146	5,670,549	5,667,730	4,060,000	5,750,000
Montana	2,976,358	3,048,495	3,240,973	2,805,173	2,789,755	3,632,527	4,226,689	4,532,505	3,300,000	4,440,000
New Mexico	3,148,158	3,536,824	3,708,806	3,877,689	3,817,940	3,793,011	4,000,527	4,023,239	3,170,000	3,750,000
North Dakota	502,628	499,480	495,320	506,685	528,078	634,912	790,548	719,733	750,000	770,000
Ohio	30,759,986	34,528,727	36,200,527	18,843,115	22,434,691	34,728,219	40,748,734	45,812,943	35,050,000	45,000,000
Oklahoma	3,074,242	3,675,418	4,165,770	3,988,613	3,693,580	3,608,011	4,386,844	4,813,447	3,200,000	4,200,000
Oregon	46,661	41,637	46,063	51,558	39,231	42,592	28,327	13,328	13,000	18,000
Pennsylvania (bituminous)	144,561,257	161,865,488	173,781,217	147,983,294	157,955,137	170,295,424	172,448,142	178,550,741	145,300,000	163,000,000
South Dakota	....	....	....	11,850	10,593	8,886	8,042	7,942	8,000	10,000
Tennessee	6,433,156	6,473,228	6,903,784	5,943,258	5,730,361	6,137,449	6,194,221	6,831,048	5,150,000	6,750,000
Texas	1,974,593	2,188,612	2,429,144	2,323,773	2,088,908	1,987,503	2,355,815	2,261,135	1,600,000	1,800,000
Utah	2,513,175	3,016,149	3,254,828	3,103,036	3,108,715	3,567,428	4,125,230	5,136,825	4,570,000	5,870,000
Virginia	6,864,667	7,846,638	8,828,068	7,959,535	8,122,596	9,707,474	10,087,091	10,289,808	9,500,000	9,850,000
Washington	3,572,815	3,360,932	3,877,891	3,064,820	2,429,095	3,038,588	4,009,902	4,082,212	3,100,000	3,750,000
West Virginia	59,831,580	66,786,687	71,308,982	71,707,626	77,184,069	86,460,127	86,441,667	89,935,839	75,500,000	87,500,000
Wyoming	6,744,864	7,368,124	7,393,066	6,475,293	6,554,028	7,910,647	8,575,619	9,438,688	7,100,000	10,000,000
Total (bituminous)	**405,907,059**	**450,104,982**	**478,523,203**	**422,703,970**	**442,624,426**	**502,519,682**	**551,790,563**	**579,385,820**	**458,063,000**	556,563,000
Pennsylvania (anthracite)	90,464,067	84,361,598	91,524,922	90,821,507	88,995,061	87,578,493	99,611,811	98,826,084	88,092,000	89,100,000
Total	**496,371,126**	**534,466,580**	**570,048,125**	**513,525,477**	**531,619,487**	**590,098,175**	**651,402,374**	**678,211,904**	**546,155,000**	645,663,000

[a] Compiled from Mineral Resources, U. S. Geological Survey.

[b] Estimated.

[c] Not available.

TABLE 31.—*United States: Number of men employed underground during the years ended Dec. 31, **1911** to **1918**.*[a]

State.	1911	1912	1913	1914	1915	1916	1917	1918
Alabama	18,592	19,107	20,746	20,320	18,984	21,453	22,925	20,584
Alaska	(b)	(c)	(b)	(c)	(c)	69	(c)	170
Arkansas	4,498	3,822	3,920	3,674	3,097	3,055	3,135	3,107
California, Idaho, and Nevada	d 35	39	d 27	17	15	11	11	10
Colorado	12,240	11,071	10,211	7,891	9,860	10,456	11,285	11,320
Georgia and North Carolina	420	370	412	275	291	322	205	170
Illinois	68,033	70,229	71,516	72,308	68,493	68,127	75,085	75,270
Indiana	18,352	18,929	19,440	20,427	20,308	20,992	22,664	23,979
Iowa	14,787	14,364	13,826	14,242	13,990	12,960	12,672	11,774
Kansas	10,592	10,433	11,180	10,778	11,412	10,325	8,816	8,652
Kentucky	19,592	19,738	21,385	24,262	23,523	26,501	28,162	30,323
Maryland	5,256	5,328	4,881	4,730	4,977	4,719	4,696	4,377
Michigan	2,623	2,514	2,669	2,234	2,237	2,124	2,154	2,207
Missouri	8,650	8,737	9,380	8,405	7,614	7,877	7,680	7,644
Montana	3,149	2,804	2,958	2,786	2,626	3,065	3,338	3,347
New Mexico	3,058	3,246	3,578	3,386	3,437	3,304	3,191	2,971
North Dakota	524	429	442	407	455	553	619	602
Ohio	40,363	40,423	40,679	40,438	35,813	36,680	38,569	39,883
Oklahoma	7,419	7,467	7,687	6,950	7,270	6,620	7,017	7,057
Oregon	248	181	166	132	120	78	77	25
Pennsylvania (bituminous)	150,112	144,880	151,066	162,081	152,086	139,186	143,687	140,502
South Dakota	....	....	....	31	18	26	34	21
Tennessee	9,146	8,476	9,260	8,267	7,510	7,661	8,053	8,198
Texas	4,356	4,485	4,462	4,059	4,476	3,901	3,683	3,391
Utah	2,633	2,543	3,177	2,964	2,763	2,397	2,569	3,065
Virginia	6,691	7,163	7,562	7,587	7,261	7,359	8,607	8,788
Washington	5,589	4,263	4,475	4,439	3,785	3,764	4,072	3,836
West Virginia	55,498	56,703	62,133	66,073	63,842	64,618	69,155	69,047
Wyoming	6,838	6,769	7,017	6,862	6,170	6,041	6,024	5,932
Total (bituminous)	**479,294**	**474,513**	**494,255**	**506,025**	**482,433**	**474,244**	**498,185**	**496,252**
Pennsylvania (anthracite)	126,541	126,606	127,854	133,309	130,963	116,705	109,989	101,671
Total	**605,835**	**601,119**	**622,109**	**639,334**	**613,396**	**590,949**	**608,174**	**597,923**

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[a] Compiled (except for 1911) from Mineral Resources, U. S. Geological Survey.
[b] Included in California.
[c] Not available.
[d] Includes Alaska.

TABLE 32.—*United States: Number of men employed on the surface during the years ended Dec. 31,* ***1911*** *to* ***1918.***[a]

State.	1911	1912	1913	1914	1915	1916	1917	1918
Alabama	3,411	3,506	3,806	3,722	3,607	3,855	5,461	5,637
Alaska	(b)	(c)	(b)	(c)	(c)	14	(c)	69
Arkansas	840	714	732	665	654	717	863	871
California, Idaho, and Nevada	[d] 34	33	[d] 25	26	21	7	6	5
Colorado	2,133	1,929	1,779	2,207	2,512	2,648	2,946	3,163
Georgia and North Carolina	90	80	88	80	77	89	76	70
Illinois	7,623	7,869	8,013	7,191	7,117	7,411	9,005	10,695
Indiana	2,639	2,722	2,795	2,748	2,469	2,973	3,864	6,397
Iowa	2,065	2,006	1,931	1,815	1,559	1,483	1,594	1,554
Kansas	1,231	1,213	1,299	1,670	1,848	1,807	1,864	2,013
Kentucky	4,532	4,566	4,947	4,502	4,437	4,721	6,764	9,019
Maryland	823	834	764	673	687	914	1,223	1,191
Michigan	625	599	636	566	332	411	252	351
Missouri	957	967	1,038	1,144	1,559	1,777	1,988	1,946
Montana	715	636	672	564	532	716	811	1,212
New Mexico	642	682	751	792	768	1,218	935	1,124
North Dakota	236	193	199	151	135	161	202	226
Ohio	5,096	5,104	5,136	4,963	4,240	4,714	6,940	8,567
Oklahoma	1,310	1,318	1,357	1,128	1,187	1,180	1,478	1,394
Oregon	56	41	37	58	31	28	27	15
Pennsylvania (bituminous)	20,996	20,264	21,130	22,120	22,507	29,026	30,281	33,804
South Dakota	....	....	....	16	17	12	....	....
Tennessee	1,978	1,833	2,003	1,849	1,438	1,550	2,368	2,496
Texas	624	642	639	576	611	580	692	545
Utah	813	785	981	1,148	801	732	916	1,095
Virginia	1,416	1,515	1,600	1,596	1,698	2,418	2,561	2,216
Washington	1,647	1,256	1,319	1,366	1,065	1,033	1,240	1,273
West Virginia	11,302	11,545	12,653	12,890	12,040	13,449	19,267	20,483
Wyoming	1,280	1,267	1,314	1,255	1,074	1,214	1,334	1,622
Total (bituminous)	**75,114**	**74,119**	**77,644**	**77,481**	**75,023**	**86,858**	**104,958**	**119,053**
Pennsylvania (anthracite)	47,399	47,424	47,891	46,370	45,589	43,164	44,185	45,450
Total	**122,513**	**121,543**	**125,535**	**123,851**	**120,612**	**130,022**	**149,143**	**164,503**

[a] Compiled (except for 1911) from Mineral Resources, U. S. Geol. Survey.
[b] Included in California.
[c] Not available.
[d] Includes Alaska.

TABLE 33.—*United States: Number of men employed underground and on the surface during the years ended Dec. 31, **1911** to **1918**.*[a]

State.	1911	1912	1913	1914	1915	1916	1917	1918
Alabama	22,003	22,613	24,552	24,042	22,591	25,308	28,386	26,221
Alaska	15	([b])	([c])	([b])	([b])	83	([b])	239
Arkansas	5,338	4,536	4,652	4,339	3,751	3,772	3,998	3,978
California, Idaho, and Nevada	54	72	[d] 52	43	36	18	17	15
Colorado	14,373	13,000	11,990	10,098	12,372	13,104	14,231	14,483
Georgia and North Carolina	510	450	500	355	368	411	281	240
Illinois	75,656	78,098	79,529	79,499	75,610	75,538	84,090	85,965
Indiana	20,991	21,651	22,235	23,175	22,777	23,965	26,528	30,376
Iowa	16,852	16,370	15,757	16,057	15,549	14,443	14,266	13,328
Kansas	11,823	11,646	12,479	12,448	13,260	12,132	10,680	10,665
Kentucky	24,124	24,304	26,332	28,764	27,960	31,222	34,926	39,342
Maryland	6,079	6,162	5,645	5,403	5,664	5,633	5,919	5,568
Michigan	3,248	3,113	3,305	2,800	2,569	2,535	2,406	2,558
Missouri	9,607	9,704	10,418	9,549	9,173	9,654	9,668	9,590
Montana	3,864	3,440	3,630	3,350	3,158	3,781	4,149	4,559
New Mexico	3,700	3,928	4,329	4,178	4,205	4,522	4,126	4,095
North Dakota	760	622	641	558	590	714	821	828
Ohio	45,459	45,527	45,815	45,401	40,053	41,394	45,509	48,450
Oklahoma	8,729	8,785	9,044	8,078	8,457	7,800	8,495	8,451
Oregon	304	222	203	190	151	106	104	40
Pennsylvania (bituminous)	171,108	165,144	172,196	184,201	174,593	168,212	173,968	174,306
South Dakota	....	....	....	47	35	38	34	21
Tennessee	11,124	10,309	11,263	10,116	8,948	9,211	10,421	10,694
Texas	4,980	5,127	5,101	4,635	5,087	4,481	4,375	3,936
Utah	3,446	3,328	4,158	4,112	3,564	3,129	3,485	4,160
Virginia	8,107	8,678	9,162	9,183	8,959	9,777	11,168	11,004
Washington	7,236	5,519	5,794	5,805	4,850	4,797	5,312	5,109
West Virginia	66,800	68,248	74,786	78,963	75,882	78,067	88,422	89,530
Wyoming	8,118	8,036	8,331	8,117	7,244	7,255	7,358	7,554
Total (bituminous)	**554,408**	**548,632**	**571,899**	**583,506**	**557,456**	**561,102**	**603,143**	**615,305**
Pennsylvania (anthracite	173,940	174,030	175,745	179,679	176,552	159,869	154,174	147,121
Total	**728,348**	**722,662**	**747,644**	**763,185**	**734,008**	**720,971**	**757,317**	**762,426**

[a] Compiled (except for 1911) from Mineral Resources, U. S. Geol. Survey.
[b] Not available.
[c] Included in California.
[d] Includes Alaska.

TABLE 34.—*United States: Number of 300-day workers employed underground during the years ended Dec. 31,* ***1911*** *to* ***1918.***

State.	1911	1912	1913	1914	1915	1916	1917	1918
Alabama	14,068	15,604	17,634	15,308	14,125	18,746	20,839	19,092
Alaska	(a)	(b)	(a)	(b)	(b)	41	(b)	144
Arkansas	1,994	2,000	2,274	1,751	1,541	1,871	1,955	2,109
California, Idaho, and Nevada	c 30	27	c 26	17	14	7	6	8
Colorado	8,445	8,377	7,794	6,418	6,384	8,116	9,895	9,640
Georgia and North Carolina	388	313	358	190	191	300	184	120
Illinois	42,634	45,415	45,055	41,698	40,908	44,869	60,761	59,610
Indiana	11,134	11,484	12,312	11,439	12,095	13,055	16,689	18,165
Iowa	10,006	9,002	8,987	9,685	10,282	8,725	10,613	9,608
Kansas	6,708	7,025	7,342	6,898	7,014	7,022	6,341	6,736
Kentucky	13,127	13,225	15,112	15,124	14,635	18,391	20,086	23,220
Maryland	4,257	4,600	4,035	3,800	4,012	4,020	3,978	3,807
Michigan	1,906	1,534	1,673	1,497	1,474	1,527	1,825	1,744
Missouri	5,248	5,999	5,847	5,015	4,720	5,437	6,138	5,977
Montana	2,309	2,056	2,248	1,941	1,759	2,489	2,977	2,942
New Mexico	2,345	2,965	3,447	3,194	3,002	3,216	3,418	2,982
North Dakota	400	332	326	293	332	450	527	459
Ohio	24,083	27,083	27,933	14,558	16,967	24,056	27,052	29,606
Oklahoma	3,858	4,331	5,048	4,749	4,042	3,938	4,943	5,369
Oregon	148	144	156	117	83	61	64	24
Pennsylvania (bituminous)	116,587	121,699	134,448	115,618	114,556	120,256	125,154	126,144
South Dakota	....	....	....	16	9	12	17	10
Tennessee	7,073	6,611	7,439	6,062	5,507	6,098	6,466	7,240
Texas	3,282	3,439	3,763	3,207	3,472	2,840	3,229	2,957
Utah	2,071	2,416	2,891	2,075	1,916	1,822	1,877	2,649
Virginia	5,821	5,993	7,058	5,943	5,687	6,675	7,824	8,108
Washington	4,192	3,212	3,878	2,826	2,131	2,721	3,680	3,510
West Virginia	40,883	50,277	48,464	44,269	44,331	51,036	51,850	54,700
Wyoming	5,243	5,370	5,427	4,392	4,129	4,991	4,945	5,301
Total (bituminous)	**337,104**	**352,721**	**382,224**	**328,916**	**325,741**	**364,163**	**403,353**	**412,258**
Pennsylvania (anthracite)	103,764	97,487	109,528	108,869	100,290	98,483	104,396	99,385
Total	**444,279**	**450,840**	**493,540**	**441,141**	**427,532**	**463,733**	**509,677**	**513,655**

[a] Included in California.

[b] Not available.

[c] Includes Alaska.

TABLE 35.—*United States: Number of 300-day workers employed on the surface during the years ended Dec. 31,* ***1911*** *to* ***1918.***

State.	1911	1912	1913	1914	1915	1916	1917	1918
Alabama	2,581	2,863	3,235	2,804	2,684	3,369	4,964	5,229
Alaska	(a)	(b)	(a)	(b)	(b)	8	(b)	59
Arkansas	373	374	424	317	325	439	538	591
California, Idaho, and Nevada	c 30	22	c 25	25	20	4	4	4
Colorado	1,472	1,460	1,358	1,795	1,626	2,055	2,583	2,694
Georgia and North Carolina	83	68	77	55	51	83	68	50
Illinois	4,777	5,088	5,048	4,146	4,251	4,881	7,287	8,470
Indiana	1,601	1,651	1,770	1,539	1,470	1,849	2,845	4,846
Iowa	1,397	1,257	1,255	1,234	1,146	998	1,335	1,268
Kansas	780	817	853	1,069	1,136	1,229	1,341	1,567
Kentucky	3,036	3,059	3,496	2,806	2,760	3,276	4,824	6,906
Maryland	667	720	632	540	554	778	1,036	1,036
Michigan	454	365	398	379	219	296	213	277
Missouri	580	664	647	683	966	1,227	1,589	1,522
Montana	525	467	511	393	357	582	724	1,065
New Mexico	492	623	723	747	671	1,186	1,002	1,128
North Dakota	180	149	146	109	99	131	172	172
Ohio	3,041	3,420	3,527	1,786	2,009	3,092	4,868	6,359
Oklahoma	681	764	891	771	660	702	1,041	1,061
Oregon	33	33	35	51	21	22	23	15
Pennsylvania (bituminous)	16,307	17,022	18,806	15,779	16,953	25,078	26,375	30,349
South Dakota	....	....	....	8	9	6	....	....
Tennessee	1,530	1,430	1,609	1,356	1,054	1,234	1,901	2,205
Texas	470	492	539	455	474	422	607	475
Utah	640	746	893	803	555	557	669	947
Virginia	1,232	1,268	1,493	1,250	1,330	2,193	2,328	2,045
Washington	1,235	946	1,143	870	600	747	1,121	1,165
West Virginia	8,326	10,236	9,869	8,636	8,360	10,622	14,446	16,227
Wyoming	981	1,005	1,016	803	719	1,003	1,095	1,449
Total (bituminous)	**52,830**	**55,095**	**60,045**	**50,363**	**50,656**	**66,696**	**84,979**	**98,902**
Pennsylvania (anthracite)	38,867	36,516	41,027	37,860	34,911	36,424	41,938	44,428
Total	**89,843**	**91,157**	**99,591**	**85,457**	**84,066**	**102,033**	**124,989**	**141,318**

[a] Included in California.

[b] Not available.

[c] Includes Alaska.

TABLE 36.—*United States: Number of 300-day workers employed underground and on the surface during the years ended Dec. 31,* ***1911*** *to* ***1918***.

State.	1911	1912	1913	1914	1915	1916	1917	1918
Alabama	16,649	18,467	20,869	18,112	16,809	22,115	25,803	24,321
Alaska	15	(a)	(b)	(a)	(a)	49	(a)	203
Arkansas	2,367	2,374	2,698	2,068	1,866	2,310	2,493	2,700
California, Idaho, and Nevada	45	49	c 51	42	34	11	10	12
Colorado	9,917	9,837	9,152	8,213	8,010	10,171	12,478	12,334
Georgia and North Carolina	471	381	435	245	242	383	252	170
Illinois	47,411	50,503	50,103	45,844	45,159	49,750	68,048	68,080
Indiana	12,735	13,135	14,082	12,978	13,565	14,904	19,534	23,011
Iowa	11,403	10,259	10,242	10,919	11,428	9,723	11,948	10,876
Kansas	7,488	7,842	8,195	7,967	8,150	8,251	7,682	8,303
Kentucky	16,163	16,284	18,608	17,930	17,395	21,667	24,910	30,126
Maryland	4,924	5,320	4,667	4,340	4,566	4,798	5,014	4,843
Michigan	2,360	1,899	2,071	1,876	1,693	1,823	2,038	2,021
Missouri	5,828	6,663	6,494	5,698	5,686	6,664	7,727	7,499
Montana	2,834	2,523	2,759	2,334	2,116	3,071	3,700	4,007
New Mexico	2,837	3,588	4,170	3,941	3,673	4,402	4,420	4,110
North Dakota	580	481	472	402	431	581	699	631
Ohio	27,124	30,503	31,460	16,344	18,976	27,148	31,920	35,965
Oklahoma	4,539	5,095	5,939	5,520	4,702	4,640	5,984	6,430
Oregon	181	177	191	168	104	83	87	39
Pennsylvania (bituminous)	132,894	138,721	153,254	131,397	131,509	145,334	151,529	156,493
South Dakota				24	18	18	17	10
Tennessee	8,603	8,041	9,048	7,418	6,561	7,332	8,367	9,445
Texas	3,752	3,931	4,302	3,662	3,946	3,262	3,836	3,423
Utah	2,711	3,162	3,784	2,878	2,471	2,379	2,546	3,596
Virginia	7,053	7,261	8,551	7,193	7,017	8,868	10,152	10,153
Washington	5,427	4,158	5,021	3,696	2,731	3,468	4,801	4,675
West Virginia	49,2[illegible]9	60,513	58,333	52,905	52,691	61,658	66,296	70,927
Wyoming	6,224	6,375	6,443	5,195	4,848	5,994	6,040	6,750
Total (bituminous)	**389,934**	**407,816**	**442,269**	**379,279**	**376,397**	**430,859**	**488,332**	**511,160**
Pennsylvania (anthracite)	142,631	134,003	150,555	146,738	135,201	134,907	146,334	143,813
Total	**534,122**	**541,997**	**593,131**	**526,598**	**511,598**	**565,766**	**634,666**	**654,973**

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[a] Not available.

[b] Included in California.

[c] Includes Alaska.

TABLE 37.—*United States: Average number of days the coal mines were operated during the years ended Dec. 31,* ***1911*** *to* ***1918.***[a]

State.	1911	1912	1913	1914	1915	1916	1917	1918
Alabama	227	245	255	226	223	262	273	278
Alaska	298	(b)	(c)	(b)	(b)	179	(b)	254
Arkansas	133	157	174	143	149	184	187	204
California, Idaho, and Nevada	248	203	d 294	291	285	188	173	240
Colorado	207	227	229	244	194	233	263	255
Georgia and North Carolina	277	254	261	207	197	280	269	212
Illinois	188	194	189	173	179	198	243	238
Indiana	182	182	190	168	179	187	221	227
Iowa	203	188	195	204	220	202	251	245
Kansas	190	202	197	192	184	204	216	234
Kentucky	201	201	212	187	187	208	214	230
Maryland	243	259	248	241	242	256	254	261
Michigan	218	183	188	201	198	216	254	237
Missouri	182	206	187	179	186	207	240	235
Montana	220	220	228	209	201	244	268	264
New Mexico	230	274	289	283	262	292	321	301
North Dakota	229	232	221	216	219	244	255	229
Ohio	179	201	206	108	142	197	210	223
Oklahoma	156	174	197	205	167	178	211	228
Oregon	179	239	283	266	206	236	251	292
Pennsylvania (bituminous)	233	252	267	214	226	259	261	269
South Dakota				152	155	145	154	145
Tennessee	232	234	241	220	220	239	241	265
Texas	226	230	253	237	233	218	263	262
Utah	236	285	273	210	208	228	219	250
Virginia	261	251	280	235	235	272	273	277
Washington	225	226	260	191	169	217	271	275
West Virginia	221	266	234	201	208	237	225	238
Wyoming	230	238	232	192	201	248	246	268
Total (bituminous)	**211**	**223**	**232**	**195**	**203**	**230**	**243**	**249**
Pennsylvania (anthracite)	246	231	257	245	230	253	285	293
Total	**220**	**225**	**238**	**207**	**209**	**235**	**251**	**258**

[a] Compiled from Mineral Resources, U. S. Geol. Survey.
[b] Not available.
[c] Included in California.
[d] Includes Alaska.

Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

TABLE 38.—*United States: Number of days of labor performed underground during the years ended Dec. 31, **1911** to **1918**.*[a]

State.	1911	1912	1913	1914	1915	1916	1917	1918
Alabama	4,220,384	4,681,215	5,290,230	4,592,320	4,237,622	5,623,990	6,251,775	5,727,715
Alaska	(b)	(c)	(b)	(c)	(c)	12,368	(c)	43,245
Arkansas	598,234	600,054	682,080	525,382	462,076	561,276	586,506	632,784
California, Idaho, and Nevada	(d)	7,924	d 7,938	4,947	4,275	2,066	1,902	2,400
Colorado	2,533,680	2,513,117	2,338,319	1,925,404	1,915,004	2,434,719	2,968,579	2,892,159
Georgia and North Carolina	116,340	93,980	107,532	56,925	57,429	90,094	55,182	36,099
Illinois	12,790,204	13,624,426	13,516,524	12,509,284	12,272,500	13,460,614	18,228,152	17,882,923
Indiana	3,340,064	3,445,078	3,693,600	3,431,736	3,628,390	3,916,372	5,006,656	5,449,389
Iowa	3,001,761	2,700,432	2,696,070	2,905,368	3,084,681	2,617,492	3,183,793	2,882,247
Kansas	2,012,480	2,107,466	2,202,460	2,069,376	2,104,199	2,106,594	1,902,373	2,020,814
Kentucky	3,937,992	3,967,338	4,533,620	4,536,994	4,390,400	5,517,257	6,025,626	6,965,856
Maryland	1,277,208	1,379,952	1,210,488	1,139,930	1,203,698	1,205,918	1,193,406	1,142,237
Michigan	571,814	460,062	501,772	449,034	442,377	458,115	547,429	523,023
Missouri	1,574,300	1,799,822	1,754,060	1,504,495	1,415,906	1,631,287	1,841,422	1,793,095
Montana	692,780	616,880	674,424	582,274	527,736	746,832	893,168	882,575
New Mexico	703,340	889,404	1,034,042	958,238	900,672	964,857	1,025,544	894,554
North Dakota	119,996	99,528	97,682	87,912	99,640	135,003	158,100	137,660
Ohio	7,224,977	8,125,023	8,379,874	4,367,304	5,090,175	7,216,912	8,115,671	8,881,614
Oklahoma	1,157,364	1,299,258	1,514,339	1,424,750	1,212,664	1,181,454	1,482,779	1,610,722
Oregon	44,392	43,259	46,978	35,112	24,745	18,391	19,308	7,287
Pennsylvania (bituminous)	34,976,096	36,509,760	40,334,622	34,685,334	34,366,760	36,076,897	37,546,106	37,842,966
South Dakota				4,712	2,796	3,760	5,238	3,043
Tennessee	2,121,872	1,983,384	2,231,660	1,818,740	1,652,003	1,829,417	1,939,652	2,172,124
Texas	984,456	1,031,550	1,128,886	961,983	1,041,521	851,845	968,856	887,102
Utah	621,388	724,755	867,321	622,440	574,799	546,702	563,006	794,815
Virginia	1,746,351	1,797,913	2,117,360	1,782,945	1,706,077	2,002,403	2,347,262	2,432,569
Washington	1,257,525	963,438	1,163,500	847,849	639,405	816,350	1,104,039	1,053,041
West Virginia	12,265,058	15,082,998	14,539,122	13,280,673	13,299,243	15,310,854	15,555,002	16,409,989
Wyoming	1,572,740	1,611,022	1,627,944	1,317,504	1,238,843	1,497,379	1,483,494	1,590,201
Total (bituminous)	**101,131,034**	**105,816,399**	**114,667,160**	**98,674,875**	**97,722,372**	**109,248,814**	**121,005,863**	**123,677,284**
Pennsylvania (anthracite)	31,129,086	29,245,986	32,858,478	32,660,705	30,086,879	29,544,777	31,318,796	29,815,515
Total	**133,283,700**	**135,251,775**	**148,061,942**	**132,342,138**	**128,259,767**	**139,120,032**	**152,903,042**	**154,096,435**

[a] Compiled from Mineral Resources, U. S. Geol. Survey.

[b] Included in California.

[c] Not available.

[d] Includes Alaska.

TABLE 39.—*United States: Number of days of labor performed on the surface during the years ended Dec. 31,* ***1911*** *to* ***1918.***[a]

State.	1911	1912	1913	1914	1915	1916	1917	1918
Alabama	774,297	858,970	970,530	841,172	805,158	1,010,603	1,489,242	1,568,552
Alaska	(b)	(c)	(b)	(c)	(c)	2,510	(c)	17,553
Arkansas	111,720	112,098	127,368	95,095	97,578	131,729	161,453	177,391
California, Idaho, and Nevada	(d)	6,704	d 7,350	7,566	5,985	1,314	1,038	1,200
Colorado	441,531	437,883	407,391	538,508	487,879	616,595	774,960	808,118
Georgia and North Carolina	24,930	20,320	22,968	16,560	15,196	24,902	20,458	14,865
Illinois	1,433,124	1,526,586	1,514,457	1,244,043	1,275,217	1,464,273	2,186,117	2,540,957
Indiana	480,298	495,404	531,050	461,664	441,131	554,658	853,589	1,453,763
Iowa	419,195	377,128	376,545	370,260	343,747	299,517	400,486	380,416
Kansas	233,890	245,026	255,903	320,640	340,743	368,679	402,225	470,168
Kentucky	910,932	917,766	1,048,764	841,874	828,134	982,865	1,447,246	2,071,863
Maryland	199,989	216,006	189,472	162,193	166,152	233,568	310,803	310,806
Michigan	136,250	109,617	119,568	113,766	65,655	88,646	64,045	83,181
Missouri	174,174	199,202	194,106	204,776	289,913	368,007	476,661	456,485
Montana	157,300	139,920	153,216	117,876	106,914	174,463	217,004	319,593
New Mexico	147,660	186,868	217,039	224,136	201,256	355,689	300,497	338,431
North Dakota	54,044	44,776	43,979	32,616	29,564	39,305	51,593	51,680
Ohio	912,184	1,025,904	1,058,016	536,004	602,640	927,494	1,460,308	1,907,802
Oklahoma	204,360	229,332	267,329	231,240	197,996	210,591	312,319	318,174
Oregon	10,024	9,799	10,471	15,428	6,392	6,602	6,770	4,373
Pennsylvania (bituminous)	4,892,068	5,106,528	5,641,710	4,733,680	5,085,884	7,523,510	7,912,577	9,104,803
South Dakota				2,432	2,640	1,735		
Tennessee	458,896	428,922	482,723	406,780	316,323	370,134	570,359	661,335
Texas	141,024	147,660	161,667	136,512	142,174	126,652	182,039	142,575
Utah	191,868	223,725	267,813	241,080	166,635	166,953	200,745	283,555
Virginia	369,576	380,265	448,000	375,060	398,971	657,945	698,423	613,402
Washington	370,575	283,856	342,940	260,906	179,912	224,040	336,201	349,458
West Virginia	2,497,742	3,070,970	2,960,802	2,590,890	2,508,113	3,186,660	4,333,726	4,868,072
Wyoming	294,400	301,546	304,848	240,960	215,643	300,913	328,516	434,811
Total (bituminous)	**15,849,054**	**16,528,537**	**18,013,408**	**15,108,795**	**15,196,809**	**20,008,956**	**25,493,563**	**29,670,746**
Pennsylvania (anthracite)	11,660,154	10,954,944	12,307,987	11,360,650	10,473,435	10,927,269	12,581,458	13,328,439
Total	**26,952,860**	**27,347,175**	**29,877,330**	**25,637,157**	**25,219,728**	**30,609,784**	**37,496,638**	**42,395,549**

[a] Compiled from Mineral Resources, U. S. Geol. Survey.

[b] Included in California.

[c] Not available.

[d] Includes Alaska.

TABLE 40.—*United States: Number of days of labor performed underground and on the surface during the years ended Dec. 31,* ***1911*** *to* ***1918.***[a]

State.	1911	1912	1913	1914	1915	1916	1917	1918
Alabama	4,994,681	5,540,185	6,260,760	5,433,492	5,042,780	6,634,593	7,741,017	7,296,267
Alaska	4,470	(b)	(c)	(b)	(b)	14,878	(b)	60,798
Arkansas	709,954	712,152	809,448	620,477	559,654	693,005	747,959	810,175
California, Idaho, and Nevada	13,401	14,628	d 15,288	12,513	10,260	3,380	2,940	3,600
Colorado	2,975,211	2,951,000	2,745,710	2,463,912	2,402,883	3,051,314	3,743,539	3,700,277
Georgia and North Carolina	141,270	114,300	130,500	73,485	72,625	114,996	75,640	50,964
Illinois	14,223,328	15,151,012	15,030,981	13,753,327	13,547,717	14,924,887	20,414,269	20,423,880
Indiana	3,820,362	3,940,482	4,224,650	3,893,400	4,069,521	4,471,030	5,860,245	6,903,152
Iowa	3,420,956	3,077,560	3,072,615	3,275,628	3,428,428	2,917,009	3,584,279	3,262,663
Kansas	2,246,370	2,352,492	2,458,363	2,390,016	2,444,942	2,475,273	2,304,598	2,490,982
Kentucky	4,848,924	4,885,104	5,582,384	5,378,868	5,218,534	6,500,122	7,472,872	9,037,719
Maryland	1,477,197	1,595,958	1,399,960	1,302,123	1,369,850	1,439,486	1,504,209	1,453,043
Michigan	708,064	569,679	621,340	562,800	508,032	546,761	611,474	606,204
Missouri	1,748,474	1,999,024	1,948,166	1,709,271	1,705,819	1,999,294	2,318,083	2,249,580
Montana	850,080	756,800	827,640	700,150	634,650	921,295	1,110,172	1,202,168
New Mexico	851,000	1,076,272	1,251,081	1,182,374	1,101,928	1,320,546	1,326,041	1,232,985
North Dakota	174,040	144,304	141,661	120,528	129,204	174,308	209,693	189,340
Ohio	8,137,161	9,150,927	9,437,890	4,903,308	5,692,815	8,144,406	9,575,979	10,789,416
Oklahoma	1,361,724	1,528,590	1,781,668	1,655,990	1,410,660	1,392,045	1,795,098	1,928,896
Oregon	54,416	53,058	57,449	50,540	31,137	24,993	26,078	11,660
Pennsylvania (bituminous)	39,868,164	41,616,288	45,976,332	39,419,014	39,452,644	43,600,407	45,458,683	46,947,769
South Dakota	....	....	....	7,144	5,436	5,495	5,238	3,043
Tennessee	2,580,768	2,412,306	2,714,383	2,225,520	1,968,326	2,199,551	2,510,011	2,833,459
Texas	1,125,480	1,179,210	1,290,553	1,098,495	1,183,695	978,497	1,150,895	1,029,677
Utah	813,256	948,480	1,135,134	863,520	741,434	713,655	763,751	1,078,770
Virginia	2,115,927	2,178,178	2,565,360	2,158,005	2,105,048	2,660,348	3,045,685	3,045,971
Washington	1,628,100	1,247,294	1,506,440	1,108,755	819,317	1,040,390	1,440,240	1,402,499
West Virginia	14,762,800	18,153,968	17,499,924	15,871,563	15,807,356	18,497,514	19,888,728	21,278,061
Wyoming	1,867,140	1,912,568	1,932,792	1,558,464	1,454,486	1,798,292	1,812,010	2,025,012
Total (bituminous)	**116,980,088**	**122,344,936**	**132,680,568**	**113,783,670**	**112,919,181**	**129,257,770**	**146,499,426**	**153,348,030**
Pennsylvania (anthracite)	42,789,240	40,200,930	45,166,465	44,021,355	40,560,314	40,472,046	43,900,254	43,143,954
Total	**160,236,560**	**162,598,950**	**177,939,272**	**157,979,295**	**153,479,495**	**169,729,816**	**190,399,680**	**196,491,984**

[a] Compiled from Mineral Resources, U. S. Geol. Survey.
[b] Not available.
[c] Included in California.
[d] Includes Alaska.

Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

TABLE 41.—*United States: Number of men killed by underground accidents (including shaft accidents) during the years ended Dec. 31,* ***1911*** *to* ***1920.***

State.	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920
Alabama	205	120	123	127	61	116	100	107	88	72
Alaska										
Arkansas	12	6	11	10	6	7	17	13	9	8
California, Idaho, and Nevada		2	1							
Colorado	83	94	105	73	60	39	184	69	88	66
Georgia and North Carolina		2	3	1			1	1		
Illinois	166	156	157	184	131	128	215	237	167	203
Indiana	43	34	64	42	43	49	75	95	81	88
Iowa	38	19	26	37	32	29	34	30	17	21
Kansas	41	29	27	32	23	53	29	29	23	25
Kentucky	41	44	45	55	61	63	131	69	72	113
Maryland	14	14	12	17	9	31	20	17	5	7
Michigan	7	7	3	2	6	2	2	10	3	5
Missouri	7	19	10	19	17	6	11	13	10	10
Montana	14	7	18	7	12	16	21	14	10	14
New Mexico	11	16	272	17	19	19	16	29	20	31
North Dakota	1		6	3	1	1	3		3	3
Ohio	105	131	163	62	67	105	104	136	135	128
Oklahoma	26	99	23	31	17	26	36	30	36	40
Oregon	1	1		1		3				
Pennsylvania (bituminous)	490	407	561	379	408	410	457	448	372	393
South Dakota										
Tennessee	108	16	34	24	25	15	27	14	27	21
Texas	8	1	4	11	1	2	1	7	3	5
Utah	12	18	12	17	10	20	17	15	24	30
Virginia	60	68	24	17	46	51	59	41	33	25
Washington	24	14	22	16	43	19	27	31	14	16
West Virginia	323	363	321	528	462	348	329	386	298	291
Wyoming	31	35	24	43	23	29	36	39	33	36
Total (bituminous)	**1,871**	**1,722**	**2,071**	**1,755**	**1,583**	**1,587**	**1,952**	**1,880**	**1,571**	**1,654**
Pennsylvania (anthracite)	615	498	553	533	526	489	483	453	559	413
Total	**2,486**	**2,220**	**2,624**	**2,288**	**2,109**	**2,076**	**2,435**	**2,333**	**2,130**	**2,067**

TABLE 42.—*United States: Number of men killed by surface accidents during the years ended Dec. 31,* ***1911*** *to* ***1920***.

State.	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920
Alabama	4	3	1	1	2	3	8	3	5	4
Alaska										
Arkansas			1	1	2				1	1
California, Idaho, and Nevada			1							
Colorado	5	2	3	2	3	4	4	2	3	4
Georgia and North Carolina						1		1		
Illinois	6	7	7	9	5		18	1	2	4
Indiana	3	1	2	2	3	2	1	5	2	
Iowa					2	2	2	1		1
Kansas	1	1	1	1	1	1	1	3	2	1
Kentucky	3	7	3	6	3	12	11	8	12	7
Maryland	1	1	1	1	1	1	1			
Michigan		1			1		2	2		1
Missouri	1									1
Montana			2	1	1		2	3	1	
New Mexico				1				2	5	2
North Dakota									1	
Ohio	2	4	2	2		3	4	13	7	6
Oklahoma	1				5		1	1		1
Oregon										
Pennsylvania (bituminous)	25	39	48	23	30	23	38	43	27	34
South Dakota										
Tennessee	3	2	1	2			1			
Texas		1								
Utah	1	1	5	5	1	3	5	4	3	4
Virginia	8	7		10	2	2	4	2	1	1
Washington	3			1	3	2	3	2	5	2
West Virginia	18	18	16	28	32	24	55	51	34	32
Wyoming	1	1	2	8	3	1	1	2		13
Total (bituminous)	**86**	**96**	**96**	**104**	**100**	**84**	**162**	**149**	**111**	**119**
Pennsylvania (anthracite)	84	103	65	62	60	66	99	98	76	74
Total	**170**	**199**	**161**	**166**	**160**	**150**	**261**	**247**	**187**	**193**

TABLE 43.—*United States: Number of men killed by underground and surface accidents during the years ended Dec. 31, **1911** to **1920**.*

State.	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920
Alabama	209	123	124	128	63	119	108	110	93	76
Alaska	....	....	....	....	....	....	....	....	....	....
Arkansas	12	6	12	11	8	7	17	13	10	9
California, Idaho, and Nevada	....	2	2	....	....	....	....	....	....	....
Colorado	88	96	108	75	63	43	188	71	91	70
Georgia and North Carolina	....	2	3	1	....	1	1	2	....	....
Illinois	172	163	164	193	136	128	233	238	169	207
Indiana	46	35	66	44	46	51	76	100	83	88
Iowa	38	19	26	37	34	31	36	31	17	25
Kansas	42	30	28	33	24	54	30	32	25	26
Kentucky	44	51	48	61	64	75	142	77	84	120
Maryland	15	15	13	18	10	32	21	17	5	7
Michigan	7	8	3	2	7	2	4	12	3	6
Missouri	8	19	10	19	17	6	11	13	10	11
Montana	14	7	20	8	13	16	23	17	11	14
New Mexico	11	16	272	18	19	19	16	31	25	33
North Dakota	1	....	6	3	1	1	3	....	4	3
Ohio	107	135	165	64	67	108	108	149	142	134
Oklahoma	27	99	23	31	22	26	37	31	36	41
Oregon	1	1	....	1	....	3	....	....	....	....
Pennsylvania (bituminous)	515	446	609	402	438	433	495	491	399	427
South Dakota	....	....	....	....	....	....	....	....	....	....
Tennessee	111	18	35	26	25	15	28	14	27	21
Texas	8	2	4	11	1	2	1	7	3	5
Utah	13	19	17	22	11	23	22	19	27	34
Virginia	68	75	24	27	48	53	63	43	34	26
Washington	27	14	22	17	46	21	30	33	19	18
West Virginia	341	381	337	556	494	372	384	437	332	323
Wyoming	32	36	26	51	26	30	37	41	33	49
Total (bituminous)	**1,957**	**1,818**	**2,167**	**1,859**	**1,683**	**1,671**	**2,114**	**2,029**	**1,682**	**1,773**
Pennsylvania (anthracite)	699	601	618	595	586	555	582	551	635	487
Total	**2,656**	**2,419**	**2,785**	**2,454**	**2,269**	**2,226**	**2,696**	**2,580**	**2,317**	**2,260**

TABLE 44.—*United States: Number of men killed by underground accidents per 1,000 300-day workers employed underground during the years ended Dec. 31,* ***1911*** *to* ***1918***.

State.	1911	1912	1913	1914	1915	1916	1917	1918
Alabama	14.57	7.69	6.98	8.29	4.32	6.19	4.80	5.61
Alaska	......	......	......	......	......	......	......	......
Arkansas	6.02	3.00	4.84	5.71	3.89	3.74	8.70	6.16
California, Idaho, and Nevada	......	......	......	......	......	......	......	......
Colorado	9.83	11.22	13.47	11.37	9.40	4.81	18.60	7.16
Georgia and North Carolina	......	6.39	8.38	5.26	......	......	5.43	8.33
Illinois	3.89	3.43	3.48	4.41	3.20	2.85	3.54	3.98
Indiana	3.86	2.96	5.20	3.67	3.56	3.75	4.49	5.23
Iowa	3.80	2.11	2.89	3.82	3.11	3.32	3.20	3.12
Kansas	6.11	4.13	3.68	4.64	3.28	7.55	4.57	4.31
Kentucky	3.12	3.33	2.98	3.64	4.17	3.43	6.52	2.97
Maryland	3.29	3.04	2.97	4.46	2.24	7.71	5.03	4.47
Michigan	3.67	4.56	1.79	1.34	4.08	1.31	1.10	5.73
Missouri	1.33	3.17	1.71	3.79	3.60	1.11	1.79	2.18
Montana	6.06	3.40	8.01	3.61	6.82	6.43	7.05	4.76
New Mexico	4.69	5.40	78.91	5.32	6.33	5.91	4.68	9.73
North Dakota	2.50	......	18.40	10.24	3.01	2.22	5.69	......
Ohio	4.36	4.84	5.84	4.26	3.95	4.36	3.84	4.59
Oklahoma	6.74	22.86	4.56	6.53	4.21	6.60	7.28	5.59
Oregon	6.76	6.94	......	8.55	......	47.18	......	......
Pennsylvania (bituminous)	4.20	3.34	4.17	3.28	3.56	3.41	3.65	3.55
South Dakota	......	......	......	......	......	......	......	......
Tennessee	15.27	2.42	4.57	3.96	4.54	2.46	4.18	1.93
Texas	2.44	.29	1.06	3.43	.29	.70	.31	2.37
Utah	5.79	7.45	4.15	8.19	5.22	10.98	9.06	5.66
Virginia	10.31	11.35	3.40	2.86	8.09	7.64	7.54	5.06
Washington	5.73	4.36	5.67	5.66	20.18	6.98	7.34	8.83
West Virginia	7.90	7.22	6.62	11.93	10.42	6.82	6.35	7.06
Wyoming	5.91	6.52	4.42	9.79	5.57	5.81	7.28	7.36
Total (bituminous)	**5.55**	**4.88**	**5.42**	**5.34**	**4.86**	**4.36**	**4.84**	**4.56**
Pennsylvania (anthracite)	5.93	5.11	5.05	4.90	5.24	4.97	4.63	4.56
Total	**5.60**	**4.92**	**5.32**	**5.19**	**4.93**	**4.48**	**4.78**	**4.54**

TABLE 45.—*United States: Number of men killed by surface accidents per 1,000 300-day workers employed on the surface during the years ended Dec. 31,* ***1911*** *to* ***1918***.

State.	1911	1912	1913	1914	1915	1916	1917	1918
Alabama	1.55	1.05	0.31	0.36	0.75	0.89	1.61	0.57
Alaska								
Arkansas			2.36	3.15	6.15			
California, Idaho, and Nevada								
Colorado	3.40	1.37	2.21	1.11	1.84	1.95	1.55	.74
Georgia and North Carolinia						12.05		20.00
Illinois	1.26	1.38	1.39	2.17	1.18		2.47	.12
Indiana	1.87	.61	1.13	1.30	2.04	1.08	.35	1.03
Iowa					1.75	2.00	1.50	.79
Kansas	1.28	1.22	1.17	.94	.88	.81	.75	1.91
Kentucky	.99	2.29	.86	2.14	1.09	3.66	2.28	1.16
Maryland	1.50	1.39	1.58	1.85	1.81	1.29	.97	
Michigan		2.74			4.57		9.39	7.22
Missouri	1.72							
Montana			3.91	2.54	2.80		2.76	2.82
New Mexico				1.34				1.77
North Dakota								
Ohio	.66	1.17	.57	1.12		.97	.82	2.04
Oklahoma	1.47				7.58		.96	.94
Oregon								
Pennsylvania (bituminous)	1.53	2.29	2.55	1.46	1.77	.92	1.44	1.42
South Dakota								
Tennessee	1.96	1.40	.62	1.47			.53	
Texas		2.03						
Utah	1.56	1.34	5.60	6.23	1.80	5.39	7.47	4.22
Virginia	6.49	5.52		8.00	1.50	.91	1.72	.98
Washington	2.43			1.14	5.00	2.68	2.68	1.72
West Virginia	2.16	1.76	1.62	3.24	3.83	2.26	3.81	3.14
Wyoming	1.02	1.00	1.97	9.96	4.17	1.00	.91	1.38
Total (bituminous)	**1.63**	**1.74**	**1.60**	**2.07**	**1.97**	**1.26**	**1.91**	**1.51**
Pennsylvania (anthracite)	2.16	2.82	1.58	1.64	1.72	1.81	2.36	2.21
Total	**1.89**	**2.18**	**1.62**	**1.94**	**1.90**	**1.47**	**2.09**	**5.98**

TABLE 46.—*United States: Number of men killed by underground and surface accidents per 1,000 300-day workers employed underground and on the surface during the years ended Dec. 31,* ***1911*** *to* ***1918.***

State.	1911	1912	1913	1914	1915	1916	1917	1918
Alabama	12.55	6.66	5.94	7.07	3.75	5.38	4.19	4.52
Alaska								
Arkansas	5.07	2.53	4.45	5.32	4.29	3.03	6.82	4.81
California, Idaho, and Nevada								
Colorado	8.88	9.76	11.80	9.13	7.87	4.23	15.07	5.76
Georgia and North Carolina		5.25	6.90	4.08		2.60	3.17	11.76
Illinois	3.63	3.23	3.27	4.21	3.01	2.57	3.42	3.50
Indiana	3.61	2.66	4.69	3.39	3.39	3.42	3.89	4.35
Iowa	3.33	1.85	2.54	3.39	2.98	3.19	3.01	2.85
Kansas	5.61	3.83	3.42	4.15	2.94	6.54	3.91	3.85
Kentucky	2.72	3.13	2.58	3.40	3.68	3.46	5.70	2.56
Maryland	3.05	2.82	2.79	4.15	2.19	6.67	4.19	3.51
Michigan	2.97	4.21	1.45	1.07	4.13	1.10	1.96	5.94
Missouri	1.37	2.85	1.54	3.33	2.99	.90	1.42	1.73
Montana	4.94	2.77	7.25	3.43	6.14	5.21	6.21	4.24
New Mexico	3.88	4.46	65.23	4.57	5.17	4.32	3.62	7.54
North Dakota	1.72		12.71	7.46	2.32	1.72	4.29	
Ohio	3.94	4.43	5.24	3.92	3.53	3.98	3.38	4.14
Oklahoma	5.95	19.43	3.87	5.62	4.68	5.60	6.18	4.82
Oregon	5.52	5.65		5.95		36.14		
Pennsylvania (bituminous)	3.88	3.22	3.97	3.06	3.33	2.98	3.27	3.14
South Dakota								
Tennessee	12.90	2.24	3.87	3.50	3.81	2.05	3.35	1.48
Texas	2.13	.51	.93	3.00	.25	.61	.26	2.04
Utah	4.80	6.01	4.49	7.64	4.45	9.67	8.64	5.28
Virginia	9.64	10.33	2.81	3.75	6.84	5.98	6.21	4.24
Washington	4.98	3.37	4.38	4.60	16.84	6.06	6.25	7.06
West Virginia	6.93	6.30	5.78	10.51	9.37	6.03	5.79	6.16
Wyoming	5.14	5.65	4.04	9.82	5.36	5.01	6.13	6.07
Total (bituminous)	**5.02**	**4.46**	**4.90**	**4.90**	**4.47**	**3.88**	**4.31**	**3.97**
Pennsylvania (anthracite)	4.90	4.48	4.10	4.05	4.33	4.11	3.98	3.83
Total	**4.97**	**4.46**	**4.70**	**4.66**	**4.44**	**3.93**	**4.25**	**3.94**

TABLE 47.—*United States: Number of men killed per million tons of coal mined, based on underground and shaft accidents only, during the years ended Dec. 31,* **1911** *to* **1918.**

State.	1911	1912	1913	1914	1915	1916	1917	1918
Alabama	13.65	7.45	6.96	8.14	4.09	6.41	4.98	5.58
Alaska								
Arkansas	5.70	2.86	4.92	5.45	3.63	3.51	7.93	5.84
California, Idaho, and Nevada								
Colorado	8.17	8.56	11.37	8.93	6.96	3.72	14.74	5.56
Georgia and North Carolina		8.78	11.74	6.01			8.40	14.68
Illinois	3.09	2.60	2.55	3.20	2.23	1.93	2.49	2.65
Indiana	3.03	2.22	3.73	2.52	2.53	2.44	2.83	3.10
Iowa	5.18	2.61	3.45	4.97	4.20	3.99	3.79	3.66
Kansas	6.64	4.15	3.75	4.66	3.37	7.70	4.04	3.83
Kentucky	2.92	2.67	2.29	2.70	2.86	2.48	4.71	2.18
Maryland	2.99	2.82	2.51	4.11	2.15	6.95	4.21	3.78
Michigan	4.74	5.80	2.44	1.56	5.19	1.69	1.45	6.83
Missouri	1.82	4.38	2.32	4.83	4.46	1.27	1.94	2.29
Montana	4.70	2.30	5.55	2.50	4.30	4.40	4.97	3.09
New Mexico	3.49	4.52	73.34	4.38	4.98	5.01	4.00	7.21
North Dakota	1.99		12.11	5.92	1.89	1.58	3.79	
Ohio	3.41	3.79	4.50	3.29	2.99	3.02	2.55	2.97
Oklahoma	8.46	26.94	5.52	7.77	4.60	7.21	8.21	6.23
Oregon	21.43	24.02		19.40		70.44		
Pennsylvania (bituminous)	3.39	2.51	3.23	2.56	2.58	2.41	2.65	2.51
South Dakota								
Tennessee	16.79	2.47	4.92	4.04	4.36	2.44	4.36	2.05
Texas	4.05	.46	1.65	4.73	.48	1.01	.42	3.10
Utah	4.77	5.97	3.69	5.48	3.22	5.61	4.12	2.92
Virginia	8.74	8.67	2.72	2.14	5.66	5.25	5.85	3.98
Washington	6.72	4.17	5.67	5.22	17.70	6.25	6.73	7.59
West Virginia	5.40	5.44	4.50	7.36	5.99	4.02	3.81	4.29
Wyoming	4.60	4.75	3.25	6.64	3.51	3.67	4.20	4.13
Total (bituminous)	**4.61**	**3.83**	**4.33**	**4.15**	**3.58**	**3.16**	**3.54**	**3.24**
Pennsylvania (anthracite)	6.80	5.90	6.04	5.87	5.91	5.58	4.85	4.58
Total	**5.01**	**4.15**	**4.60**	**4.46**	**3.97**	**3.52**	**3.74**	**3.44**

TABLE 48.—*United States: Number of men killed per million tons of coal mined, based on* **all accidents**, *during the years ended Dec. 31,* **1911** *to* **1919.**

State.	1911	1912	1913	1914	1915	1916	1917	1918	1919 [a]
Alabama	13.91	7.64	7.01	8.21	4.22	6.58	5.38	5.73	6.11
Alaska									
Arkansas	5.70	2.86	5.37	5.99	4.84	3.51	7.93	5.84	5.95
California, Idaho, and Nevada									
Colorado	8.66	8.74	11.70	9.18	7.30	4.10	15.06	5.72	9.01
Georgia and North Carolina		8.78	11.74	6.01		5.76	8.40	29.35	
Illinois	3.20	2.72	2.66	3.35	2.31	1.93	2.70	2.67	2.62
Indiana	3.24	2.29	3.84	2.64	2.70	2.54	2.86	3.26	4.05
Iowa	5.18	2.61	3.45	4.97	4.47	4.27	4.02	3.78	2.70
Kansas	6.80	4.29	3.89	4.81	3.52	7.85	4.18	4.23	4.35
Kentucky	3.13	3.09	2.45	2.99	3.00	2.95	5.11	2.44	2.95
Maryland	3.20	3.02	2.72	4.35	2.39	7.17	4.42	3.78	1.68
Michigan	4.74	6.63	2.44	1.56	6.05	1.69	2.91	8.19	3.23
Missouri	2.09	4.38	2.32	4.83	4.46	1.27	1.94	2.29	2.46
Montana	4.70	2.30	6.17	2.85	4.66	4.40	5.44	3.75	3.33
New Mexico	3.49	4.52	73.34	4.64	4.98	5.01	4.00	7.71	7.89
North Dakota	1.99		12.11	5.92	1.89	1.58	3.79		5.33
Ohio	3.48	3.91	4.56	3.40	2.99	3.11	2.65	3.25	4.05
Oklahoma	8.78	26.94	5.52	7.77	5.96	7.21	8.43	6.44	11.25
Oregon	21.43	24.02		19.40		70.44			
Pennsylvania (bituminous)	3.56	2.76	3.50	2.72	2.77	2.54	2.87	2.75	2.75
South Dakota									
Tennessee	17.25	2.78	5.07	4.37	4.36	2.44	4.52	2.05	5.24
Texas	4.05	.91	1.65	4.73	.48	1.01	.42	3.10	1.88
Utah	5.17	6.30	5.22	7.09	3.54	6.45	5.33	3.70	5.91
Virginia	9.91	9.56	2.72	3.39	5.91	5.46	6.25	4.18	3.58
Washington	7.56	4.17	5.67	5.55	18.53	6.91	7.48	8.08	6.13
West Virginia	5.70	5.70	4.73	7.75	6.40	4.30	4.44	4.86	4.40
Wyoming	4.74	4.89	3.52	7.88	3.97	3.79	4.31	4.34	4.65
Total (bituminous)	**4.82**	**4.04**	**4.53**	**4.40**	**3.80**	**3.33**	**3.83**	**3.50**	**3.67**
Pennsylvania (anthracite)	7.73	7.12	6.75	6.55	6.58	6.34	5.84	5.58	7.21
Total	**5.35**	**4.53**	**4.89**	**4.78**	**4.27**	**3.77**	**4.14**	**3.80**	**4.24**

[a] Based on estimated production of coal.

TABLE 49.—*United States: Production per death, based on underground accidents (including shaft accidents), during the years ended Dec. 31, **1911** to **1918**.*

State.	1911	1912	1913	1914	1915	1916	1917	1918
Alabama	73,275	134,172	143,728	122,783	244,720	155,915	200,681	179,299
Alaska								
Arkansas	175,566	350,137	203,101	183,654	275,351	284,988	126,093	171,336
California, Idaho, and Nevada								
Colorado	122,378	116,785	87,929	111,925	143,750	268,827	67,844	179,820
Georgia and North Carolina		113,852	85,209	166,498			119,028	68,136
Illinois	323,368	383,880	392,476	312,985	449,081	517,151	400,927	376,756
Indiana	330,264	449,580	268,214	396,217	395,492	410,072	353,858	322,933
Iowa	192,938	383,659	289,459	201,379	237,942	250,372	263,701	273,073
Kansas	150,701	240,903	266,749	214,406	296,716	129,839	247,758	260,757
Kentucky	342,676	374,785	435,924	370,596	350,191	403,079	212,275	458,154
Maryland	334 700	354,574	398,320	243,150	464,497	143,872	237,296	264,547
Michigan	210,868	172,319	410,595	641,515	192,690	590,180	687,403	146,482
Missouri	548,015	228,413	431,813	207,157	224,211	790,358	514,504	435,979
Montana	212,597	435,499	180,054	400,739	232,480	227,033	201,271	323,750
New Mexico	286,196	221,052	13,635	228,009	200,944	199,632	250,033	138,732
North Dakota	502,628		82,553	168,895	528,078	634,912	263,516	
Ohio	292,952	263,578	222,089	303,921	334,846	330,745	391,815	336,860
Oklahoma	118,240	37,125	181,120	128,665	217,269	138,770	121,857	160,448
Oregon	46,661	41,637		51,558		14,197		
Pennsylvania (bituminous)	295,023	397,704	309,770	390,457	387,145	415,355	377,348	398,551
South Dakota								
Tennessee	59,566	404,577	203,052	247,635	225,214	409,163	229,416	487,932
Texas	246,824	2,188,612	607,286	211,252	2,088,908	993,752	2,355,815	323,019
Utah	209,431	167,564	271,236	182,532	310,872	178,371	242,661	342,455
Virginia	114,411	115,392	367,846	468,208	176,578	190,343	170,968	250,971
Washington	148,867	240,067	176,268	191,551	56,491	159,926	148,515	131,684
West Virginia	185,237	183,985	222,146	135,810	167,065	248,449	262,741	232,994
Wyoming	217,576	210,518	308,044	150,588	284,958	272,781	238,212	242,018
Total (bituminous)	**216,947**	**261,385**	**231,059**	**240 857**	**279,611**	**316,648**	**282,680**	**308,184**
Pennsylvania (anthracite)	147,096	169,401	165,506	170,397	169,192	179,097	206,236	218,159
Total	**199,667**	**240,751**	**217,244**	**224,443**	**252,072**	**284,248**	**267,516**	**290,703**

TABLE 50.—*United States: Production per death, based on* **all accidents,** *during the years ended Dec. 31,* ***1911*** *to* ***1918.***

State.	1911	1912	1913	1914	1915	1916	1917	1918
Alabama	71,873	130,899	142,569	121,824	236,951	151,985	185,816	174,409
Alaska								
Arkansas	175,566	350,137	186,176	166,958	206,513	284,988	126,093	171,336
California, Idaho, and Nevada								
Colorado	115,425	114,352	85,486	108,941	136,904	243,819	66,401	174,755
Georgia and North Carolina		113,852	85,209	166,498		173,554	119,028	34,068
Illinois	312,088	367,394	375,724	298,390	432,570	517,151	369,954	375,173
Indiana	308,725	436,735	260,086	378,208	369,699	393,991	349,202	306,786
Iowa	192,938	383,659	289,459	201,379	223,945	234,219	249,051	264,264
Kansas	147,113	232,873	257,222	207,909	284,353	127,434	239,499	236,311
Kentucky	319,311	323,344	408,679	334,144	333,776	338,587	195,831	410,553
Maryland	312,386	330,936	367,680	229,642	418,048	139,376	225,996	264,547
Michigan	210,868	150,779	410,595	641,515	165,163	590,180	343,701	122,068
Missouri	479,513	228,413	431,813	207,157	224,211	790,358	514,504	435,979
Montana	212,597	435,499	162,049	350,647	214,597	227,033	183,769	266,618
New Mexico	286,196	221,052	13,635	215,427	200,944	199,632	250,033	129,782
North Dakota	502,628		82,553	168,895	528,078	634,912	263,516	
Ohio	287,477	255,768	219,397	294,424	334,846	321,558	377,303	307,469
Oklahoma	113,861	37,125	181,120	128,665	167,890	138,770	118,563	155,272
Oregon	46,661	41,637		51,558		14,197		
Pennsylvania (bituminous)	280,701	362,927	285,355	368,118	360,628	393,292	348,380	363,647
South Dakota								
Tennessee	57,956	359,624	197,251	228,587	229,214	409,163	221,222	487,932
Texas	246,824	1,094,306	607,286	211,252	2,088,908	993,752	2,355,815	323,019
Utah	193,321	158,745	191,460	141,047	282,610	155,106	187,510	270,360
Virginia	100,951	104,622	367,836	294,798	169,221	183,160	160,113	239,298
Washington	132,326	240,067	176,268	180,284	53,980	144,695	133,663	123,703
West Virginia	175,459	175,293	211,599	128,971	156,243	232,420	225,109	205,803
Wyoming	210,777	204,670	284,349	126,967	252,078	263,688	231,773	230,212
Total (bituminous)	**207,413**	**247,582**	**220,823**	**227,382**	**262,997**	**300,730**	**261,017**	**285,552**
Pennsylvania (anthracite)	129,419	140,369	148,099	152,641	151,869	157,799	171,154	179,358
Total	**186,887**	**220,945**	**204,685**	**209,261**	**234,297**	**265,094**	**241,618**	**262,873**

TABLE 51.—*United States: Annual production of coal per man, based on* **underground employees only,** *during the years ended Dec. 31,* ***1911*** *to* ***1918.***

State.	1911	1912	1913	1914	1915	1916	1917	1918
Alabama	808	843	852	767	786	843	875	932
Alaska								
Arkansas	468	550	570	500	533	653	684	717
California, Idaho, and Nevada								
Colorado	830	992	904	1,035	875	1,003	1,106	1,096
Georgia and North Carolina	394	615	620	605	462	539	581	401
Illinois	789	853	862	796	859	972	1,148	1,186
Indiana	774	808	883	815	837	957	1,171	1,279
Iowa	496	507	544	523	544	560	708	696
Kansas	583	670	644	637	598	666	815	874
Kentucky	717	835	917	840	908	958	987	1,043
Maryland	892	932	979	874	840	945	1,011	1,027
Michigan	563	480	462	574	517	556	638	664
Missouri	443	497	460	468	501	602	738	741
Montana	945	1,087	1,096	1,007	1,062	1,185	1,266	1,354
New Mexico	1,029	1,090	1,037	1,145	1,111	1,148	1,254	1,354
North Dakota	959	1,164	1,121	1,245	1,161	1,148	1,277	1,196
Ohio	762	854	890	466	626	947	1,057	1,149
Oklahoma	414	492	542	574	508	545	625	682
Oregon	188	230	277	391	327	546	368	533
Pennsylvania (bituminous)	963	1,117	1,150	913	1,039	1,224	1,200	1,271
South Dakota				382	589	342	237	378
Tennessee	703	764	746	719	763	801	769	833
Texas	453	488	544	572	467	509	640	667
Utah	954	1,186	1,024	1,047	1,125	1,488	1,606	1,676
Virginia	1,026	1,095	1,167	1,049	1,119	1,319	1,172	1,171
Washington	639	788	867	690	642	807	985	1,064
West Virginia	1,078	1,178	1,148	1,085	1,209	1,338	1,250	1,303
Wyoming	986	1,089	1,054	944	1,062	1,309	1,424	1,591
Total (bituminous)	**847**	**949**	**968**	**835**	**917**	**1,060**	**1,108**	**1,168**
Pennsylvania (anthracite)	715	666	716	681	680	750	906	972
Total	**819**	**889**	**916**	**803**	**867**	**999**	**1,071**	**1,134**

TABLE 52.—*United States: Annual production of coal per man,* **based on all employees,** *during the years ended Dec. 31,* ***1911*** *to* ***1918.***

State.	1911	1912	1913	1914	1915	1916	1917	1918
Alabama	683	712	720	649	661	715	707	732
Alaska								
Arkansas	395	463	480	423	440	528	536	560
California, Idaho, and Nevada								
Colorado	707	844	770	809	697	800	877	857
Georgia and North Carolina	324	506	511	469	365	422	424	284
Illinois	710	767	775	724	778	876	1,025	1,039
Indiana	677	706	772	718	747	838	1,000	1,010
Iowa	435	445	478	464	490	503	628	615
Kansas	523	600	577	551	515	567	673	709
Kentucky	582	679	745	709	764	813	796	804
Maryland	771	806	847	765	739	792	802	808
Michigan	454	387	373	458	450	466	571	573
Missouri	399	447	414	412	416	491	587	591
Montana	770	886	893	837	883	961	1,019	994
New Mexico	851	900	857	928	908	839	970	982
North Dakota	661	803	773	908	895	889	963	869
Ohio	677	758	790	415	560	839	895	946
Oklahoma	352	418	461	494	437	463	516	570
Oregon	153	188	227	271	259	401	272	333
Pennsylvania (bituminous)	845	980	1,009	803	905	1,012	991	1,024
South Dakota				252	303	234	237	378
Tennessee	578	628	613	588	640	666	594	639
Texas	397	427	476	501	411	444	538	574
Utah	729	906	783	755	872	1,140	1,184	1,235
Virginia	847	904	964	867	907	993	903	935
Washington	494	609	669	528	501	633	755	799
West Virginia	896	979	954	908	1,017	1,108	978	1,005
Wyoming	831	917	887	798	905	1,090	1,165	1,249
Total (bituminous)	**732**	**820**	**837**	**724**	**794**	**896**	**915**	**942**
Pennsylvania (anthracite)	520	485	521	505	504	548	646	672
Total	**682**	**740**	**762**	**673**	**724**	**818**	**860**	**890**

TABLE 53.—*United States: Daily production of coal per man, based on* **underground employees only,** *during the years ended Dec. 31,* **1911** *to* **1918.**

State.	1911	1912	1913	1914	1915	1916	1917	1918
Alabama	3.6	3.4	3.3	3.4	3.5	3.2	3.2	3.3
Alaska	......	......	......	......	......	......	......	......
Arkansas	3.5	3.5	3.3	3.5	3.6	3.6	3.7	3.5
California, Idaho, and Nevada	......	......	......	......	......	......	......	......
Colorado	4.0	4.4	4.0	4.2	4.5	4.3	4.2	4.3
Georgia and North Carolina	1.4	2.4	2.4	2.9	2.3	1.9	2.2	1.9
Illinois	4.2	4.4	4.6	4.6	4.8	4.9	4.7	5.0
Indiana	4.3	4.4	4.6	4.8	4.7	5.1	5.3	5.6
Iowa	2.4	2.7	2.8	2.6	2.5	2.8	2.8	2.8
Kansas	3.1	3.3	3.3	3.3	3.2	3.3	3.8	3.7
Kentucky	3.6	4.2	4.3	4.5	4.9	4.6	4.6	4.5
Maryland	3.7	3.6	4.0	3.6	3.5	3.7	4.0	3.9
Michigan	2.6	2.6	2.5	2.9	2.6	2.6	2.5	2.8
Missouri	2.4	2.4	2.5	2.6	2.7	2.9	3.1	3.2
Montana	4.3	4.9	4.8	4.8	5.3	4.9	4.7	5.1
New Mexico	4.5	4.0	3.6	4.0	4.2	3.9	3.9	4.5
North Dakota	4.2	5.0	5.1	5.8	5.3	4.7	5.0	5.2
Ohio	4.3	4.2	4.3	4.3	4.4	4.8	5.0	5.2
Oklahoma	2.7	2.8	2.8	2.8	3.0	3.1	3.0	3.0
Oregon	1.1	1.0	1.0	1.5	1.6	2.3	1.5	1.8
Pennsylvania (bituminous)	4.1	4.4	4.3	4.3	4.6	4.7	4.6	4.7
South Dakota	......	......	......	2.5	3.8	2.4	1.5	2.6
Tennessee	3.0	3.3	3.1	3.3	3.5	3.4	3.2	3.1
Texas	2.0	2.1	2.2	2.4	2.0	2.3	2.4	2.5
Utah	4.0	4.2	3.8	5.0	5.4	6.5	7.3	6.5
Virginia	3.9	4.4	4.2	4.5	4.8	4.8	4.3	4.2
Washington	2.8	3.5	3.3	3.6	3.8	3.7	3.6	3.9
West Virginia	4.9	4.4	4.9	5.4	5.8	5.6	5.6	5.5
Wyoming	4.3	4.6	4.5	4.9	5.3	5.3	5.8	5.9
Total (bituminous)	**4.0**	**4.3**	**4.2**	**4.3**	**4.5**	**4.6**	**4.6**	**4.7**
Pennsylvania (anthracite)	2.9	2.9	2.8	2.8	3.0	3.0	3.2	3.3
Total	**3.7**	**4.0**	**3.9**	**3.9**	**4.1**	**4.2**	**4.3**	**4.4**

TABLE 54.—*United States: Daily production of coal per man,* **based on all employees,** *during the years ended Dec. 31,* ***1911*** *to* ***1918.***

State.	1911	1912	1913	1914	1915	1916	1917	1918
Alabama	3.0	2.9	2.8	2.9	3.0	2.7	2.6	2.6
Alaska								
Arkansas	3.0	3.0	2.8	3.0	3.0	2.9	2.9	2.8
California, Idaho, and Nevada								
Colorado	3.4	3.7	3.4	3.3	3.6	3.4	3.3	3.4
Georgia and North Carolina	1.2	2.0	2.0	2.3	1.9	1.5	1.6	1.3
Illinois	3.8	4.0	4.1	4.2	4.4	4.4	4.2	4.4
Indiana	3.7	3.9	4.1	4.3	4.2	4.5	4.5	4.5
Iowa	2.1	2.4	2.5	2.3	2.2	2.5	2.5	2.5
Kansas	2.8	3.0	2.9	2.9	2.8	2.8	3.1	3.0
Kentucky	2.9	3.4	3.5	3.8	4.1	3.9	3.7	3.5
Maryland	3.2	3.1	3.4	3.2	3.1	3.1	3.2	3.1
Michigan	2.1	2.1	2.0	2.3	2.3	2.2	2.3	2.4
Missouri	2.2	2.2	2.2	2.3	2.2	2.4	2.4	2.5
Montana	3.5	4.0	3.9	4.0	4.4	3.9	3.8	3.8
New Mexico	3.7	3.3	3.0	3.3	3.5	2.9	3.0	3.3
North Dakota	2.9	3.5	3.5	4.2	4.1	3.6	3.8	3.8
Ohio	3.8	3.8	3.8	3.8	3.9	4.3	4.3	4.2
Oklahoma	2.3	2.4	2.3	2.4	2.6	2.6	2.5	2.5
Oregon	.9	.8	.8	1.0	1.3	1.7	1.1	1.1
Pennsylvania (bituminous)	3.6	3.9	3.8	3.8	4.0	3.9	3.8	3.8
South Dakota				1.7	2.0	1.6	1.5	2.6
Tennessee	2.5	2.7	2.5	2.7	2.9	2.8	2.5	2.4
Texas	1.8	1.9	1.9	2.1	1.8	2.0	2.1	2.2
Utah	3.1	3.2	2.9	3.6	4.2	5.0	5.4	4.8
Virginia	3.3	3.6	3.4	3.7	3.9	3.7	3.3	3.4
Washington	2.2	2.7	2.6	2.8	3.0	2.9	2.8	2.9
West Virginia	4.1	3.7	4.1	4.5	4.9	4.7	4.4	4.2
Wyoming	3.6	3.9	3.8	4.2	4.5	4.4	4.7	4.7
Total (bituminous)	**3.5**	**3.7**	**3.6**	**3.7**	**3.9**	**3.9**	**3.8**	**3.8**
Pennsylvania (anthracite)	2.1	2.1	2.0	2.1	2.2	2.2	2.3	2.3
Total	**3.1**	**3.3**	**3.2**	**3.3**	**3.5**	**3.5**	**3.4**	**3.5**

TABLE 55.—*United States: Average value of coal per ton at the mines, during the years ended Dec. 31,* ***1911*** *to* ***1918.***[a]

State.	1911	1912	1913	1914	1915	1916	1917	1918
Alabama	$1.27	$1.29	$1.31	$1.34	$1.28	$1.37	$2.27	$2.85
Alaska	10.33	8.00	6.00	....	2.36	4.00	4.92	5.45
Arkansas	1.61	1.71	1.76	1.72	1.79	1.92	2.56	3.67
California, Idaho, and Nevada	1.67	2.36	3.23	2.85	2.56	2.12	2.30	2.70
Colorado	1.45	1.49	1.52	1.66	1.58	1.62	2.22	2.69
Georgia and North Carolina	1.49	1.49	1.41	1.44	1.72	1.79	2.53	3.61
Illinois	1.11	1.17	1.14	1.12	1.10	1.25	1.88	2.32
Indiana	1.08	1.14	1.11	1.10	1.10	1.27	1.99	2.29
Iowa	1.73	1.80	1.79	1.79	1.78	1.86	2.35	3.02
Kansas	1.53	1.62	1.67	1.64	1.66	1.78	2.31	2.91
Kentucky	.99	1.02	1.05	1.02	1.01	1.19	2.17	2.55
Maryland	1.11	1.18	1.24	1.27	1.28	1.56	2.46	2.77
Michigan	1.89	1.99	1.99	1.99	2.05	2.25	3.22	3.83
Missouri	1.72	1.76	1.73	1.73	1.73	1.91	2.43	3.02
Montana	1.79	1.82	1.74	1.75	1.62	1.73	2.11	2.53
New Mexico	1.44	1.42	1.46	1.61	1.44	1.47	1.86	2.68
North Dakota	1.43	1.53	1.52	1.52	1.45	1.49	1.80	2.26
Ohio	1.03	1.07	1.10	1.13	1.08	1.33	2.48	2.58
Oklahoma	2.05	2.14	2.05	2.06	2.01	2.09	2.81	3.64
Oregon	2.32	2.60	2.53	2.78	2.84	2.68	3.38	2.81
Pennsylvania (bituminous)	1.01	1.05	1.11	1.07	1.06	1.30	2.44	2.59
South Dakota	....	....	....	1.73	1.55	2.03	2.90	2.80
Tennessee	1.12	1.14	1.14	1.14	1.13	1.23	2.19	2.83
Texas	1.66	1.67	1.77	1.69	1.65	1.56	1.77	2.63
Utah	1.69	1.67	1.65	1.59	1.58	1.62	2.07	2.71
Virginia	.91	.96	1.01	1.01	.98	1.06	2.00	2.51
Washington	2.29	2.39	2.38	2.20	2.17	2.27	2.68	3.46
West Virginia	.90	.94	1.01	.99	.97	1.18	2.32	2.56
Wyoming	1.56	1.58	1.56	1.55	1.46	1.55	1.93	2.39
Total (**bituminous**)	**1.11**	**1.15**	**1.18**	**1.17**	**1.13**	**1.32**	**2.26**	**2.58**
Pennsylvania (anthracite)	1.94	2.11	2.13	2.07	2.07	2.30	2.85	3.40
Total	**1.26**	**1.30**	**1.33**	**1.33**	**1.29**	**1.47**	**2.35**	**2.70**

[a] Compiled from Mineral Resources, U. S. Geol. Survey.

TABLE 56.—*United States: Average number of days lost per man by strikes during the years ended Dec. 31,* ***1911*** *to* ***1918***[a] *(based upon number of men on strike).*

State.	1911	1912	1913	1914	1915	1916	1917	1918
Alabama	6	32	26	12	7	3	6	2
Alaska	....	....	....	....	....	....	....	....
Arkansas	7	94	27	113	22	31	11	4
California, Idaho, and Nevada	....	....	....	....	....	....	....	....
Colorado	216	....	75	247	150	2	4	5
Georgia and North Carolina	....	....	....	....	....	....	....	7
Illinois	18	33	55	41	53	11	12	7
Indiana	32	52	17	38	15	19	6	6
Iowa	20	44	19	29	5	15	6	5
Kansas	9	65	9	17	10	24	18	5
Kentucky	32	29	18	37	16	56	46	12
Maryland	....	9	2	17	....	36	16	2
Michigan	....	50	7	....	....	13	12	13
Missouri	48	58	34	49	5	6	15	5
Montana	15	10	6	7	6	4	22	1
New Mexico	....	....	130	....	....	....	9	....
North Dakota	2	2	....	....	....	3	10	8
Ohio	37	32	26	159	114	21	7	9
Oklahoma	34	14	80	31	4	20	22	20
Oregon	....	7	....	38	....	....	1	....
Pennsylvania (bituminous)	26	24	16	29	14	33	23	9
South Dakota	....	....	....	....	....	....	....	....
Tennessee	10	30	50	....	....	11	43	3
Texas	5	7	....	3	3	28	3	10
Utah	3	....	260	12	....	3	4	1
Virginia	....	....	....	....	1	....	10	20
Washington	10	39	49	55	....	11	4	17
West Virginia	11	50	43	50	35	19	18	7
Wyoming	....	10	....	11	12	1	....	....
Total (**bituminous**)	**27**	**35**	**36**	**80**	**61**	**26**	**17**	**7**
Pennsylvania (anthracite)	6	45	8	7	7	12	5	4
Total	24	40	23	68	37	20	15	6

[a] Compiled from Mineral Resources, U. S. Geol. Survey.

TABLE 57. —*United States: Number of men on strike at the coal mines, during the years ended Dec. 31, **1911** to **1918**.*[a]

State.	1911	1912	1913	1914	1915	1916	1917	1918
Alabama	210	384	1,048	320	175	300	1,835	1,952
Alaska	....	....	....	....	....	....	....	....
Arkansas	665	403	1,221	1,415	925	1,009	2,417	1,207
California, Idaho, and Nevada	....	....	....	....	....	....	....	....
Colorado	150	....	7,324	4,418	90	38	1,664	464
Georgia and North Carolina	....	....	....	....	....	....	....	230
Illinois	5,543	60,505	11,861	23,506	5,251	5,043	38,781	10,251
Indiana	4,377	15,400	2,657	8,052	1,472	8,154	11,914	8,083
Iowa	1,622	8,455	721	2,642	1,067	2,244	3,275	997
Kansas	984	2,088	3,178	2,673	1,716	6,306	7,312	4,675
Kentucky	1,080	2,759	1,029	2,250	1,045	4,830	9,348	1,226
Maryland	....	347	200	91	....	181	1,523	2,517
Michigan	....	2,028	180	....	....	1,416	163	1,367
Missouri	504	952	918	1,162	939	2,331	2,175	1,191
Montana	529	869	1,004	171	183	396	1,063	218
New Mexico	....	....	8	....	....	....	85	....
North Dakota	34	10	....	....	....	26	82	22
Ohio	9,530	27,200	10,029	40,577	15,048	7,594	7,710	4,993
Oklahoma	444	860	1,696	1,286	1,013	6,240	1,668	630
Oregon	....	60	....	21	....	....	25	....
Pennsylvania (bituminous)	5,601	22,538	17,244	36,613	5,583	36,276	23,655	12,852
South Dakota	....	....	....	....	....	....	....	....
Tennessee	163	670	857	....	....	350	4,448	835
Texas	60	238	....	221	230	2,218	75	53
Utah	208	....	5	150	....	181	212	30
Virginia	....	....	....	....	7	....	232	523
Washington	2,029	807	1,239	459	....	1,203	192	75
West Virginia	1,510	12,165	8,800	9,330	1,902	4,540	6,166	5,712
Wyoming	....	360	....	248	219	276	....	....
Total (bituminous)	**35,513**	**159,098**	**71,309**	**135,605**	**36,865**	**91,152**	**126,020**	**60,105**
Pennsylvania (anthracite)	5,900	151,958	64,086	26,115	30,325	79,481	34,220	19,290
Total	41,413	311,056	135,395	161,720	67,190	170,633	160,240	79,395

[a] Compiled from Mineral Resources, U. S. Geol. Survey.

TABLE 58.—*United States: Number of man-days of labor lost by strikes during the years ended Dec. 31, **1911** to **1918**.*[a]

State.	1911	1912	1913	1914	1915	1916	1917	1918
Alabama	1,260	12,323	27,041	3,940	1,290	920	10,220	3,259
Alaska	...	...	...	...	...	...	...	...
Arkansas	4,615	37,685	32,481	159,854	20,304	30,847	27,315	4,292
California, Idaho, and Nevada	...	...	...	...	...	...	...	...
Colorado	32,375	...	552,082	1,090,025	13,500	82	7,292	2,318
Georgia and North Carolina	...	...	...	...	...	...	...	1,610
Illinois	100,588	2,026,526	655,622	970,466	276,458	55,416	464,511	74,850
Indiana	146,636	795,887	44,143	302,855	21,361	154,974	74,695	51,015
Iowa	31,870	370,449	13,538	76,791	5,229	32,587	18,407	4,774
Kansas	8,507	13,487	28,936	45,257	17,425	152,838	128,514	25,047
Kentucky	34,008	79,685	18,638	82,919	16,455	269,859	425,725	15,318
Maryland	...	3,228	400	1,547	...	6,546	24,605	5,402
Michigan	...	101,424	1,260	...	...	18,189	1,964	18,194
Missouri	24,216	55,022	31,251	56,536	4,597	14,837	31,767	5,800
Montana	8,114	8,445	6,682	1,271	1,084	1,530	23,680	218
New Mexico	...	...	1,040	...	...	...	775	...
North Dakota	69	20	...	...	...	78	811	166
Ohio	350,039	895,777	263,234	6,452,762	1,722,013	156,689	56,875	44,837
Oklahoma	15,106	12,109	135,274	39,500	4,485	126,452	37,301	12,294
Oregon	...	420	...	798	...	...	25	...
Pennsylvania (bituminous)	148,124	538,248	274,296	1,052,005	78,446	1,200,479	544,322	112,929
South Dakota	...	...	...	...	...	...	...	...
Tennessee	1,630	20,011	42,966	...	...	3,784	192,730	2,454
Texas	300	1,724	...	693	760	62,905	260	550
Utah	624	...	1,300	1,800	...	543	848	30
Virginia	...	...	...	...	7	...	2,283	10,241
Washington	22,215	31,347	60,145	25,410	...	13,304	840	1,275
West Virginia	16,483	606,588	377,405	466,768	66,698	86,352	111,479	42,009
Wyoming	...	3,425	...	2,727	2,628	308	...	...
Total (**bituminous**)	**946,779**	**5,613,830**	**2,567,734**	**10,833,924**	**2,252,740**	**2,389,519**	**2,187,244**	**438,882**
Pennsylvania (anthracite)	36,958	6,913,475	481,678	179,743	214,691	955,067	161,155	69,644
Total	983,737	12,527,305	3,049,412	11,013,667	2,467,431	3,344,586	2,348,399	508,526

[a] Compiled from Mineral Resources, U. S. Geol. Survey.

TABLE 59.—*United States: Percentage of bituminous coal mined by machines, during the years ended Dec. 31,* ***1911*** *to* ***1918.***[a]

State.	1911	1912	1913	1914	1915	1916	1917	1918
Alabama	19.6	23.2	23.3	31.7	35.4	32.1	30.1	31.0
Alaska								
Arkansas	1.3	3.7	11.2	19.1	23.7	11.2	7.2	10.9
California, Idaho, and Nevada								
Colorado	19.5	23.2	25.0	30.6	30.5	31.9	32.7	36.9
Georgia and North Carolina								
Illinois	43.0	44.9	53.0	56.7	61.2	61.7	56.3	56.6
Indiana	49.6	54.7	56.7	56.2	58.4	56.6	54.1	49.0
Iowa	.6	1.3	1.6	4.1	5.5	8.8	11.4	10.7
Kansas	1.7	1.1	.3	.6	.6	.6	.5	.7
Kentucky	65.4	66.4	73.2	77.2	81.8	84.4	83.6	78.5
Maryland	3.3	2.5	1.7	2.7	5.4	5.0	6.1	6.7
Michigan	49.7	52.7	70.0	77.8	84.2	88.5	87.3	86.8
Missouri	19.6	20.7	20.0	19.0	22.6	20.0	19.9	22.0
Montana	39.4	32.3	33.2	43.3	55.0	55.7	49.0	50.0
New Mexico	3.0	8.1	13.4	16.0	16.9	13.5	26.3	30.7
North Dakota	38.4	33.8	44.9	41.1	38.6	34.4	38.0	47.9
Ohio	86.3	87.0	90.2	85.7	89.2	91.1	87.9	84.8
Oklahoma	2.8	7.1	16.1	26.4	30.4	34.8	36.6	39.5
Oregon	47.8	50.8	53.2	53.8	55.6	55.4	55.4	55.0
Pennsylvania (bituminous)								
South Dakota								
Tennessee	14.2	18.6	26.7	23.2	26.3	24.7	22.6	22.7
Texas	3.6	4.8	4.2	1.2	1.6	1.0	.1	.1
Utah	2.8	3.8	19.2	30.4	49.6	57.5	54.8	53.9
Virginia	37.2	40.8	47.6	51.4	63.2	61.9	63.9	62.2
Washington	5.3	7.7	7.2	10.7	12.8	9.1	5.8	6.1
West Virginia	48.7	52.3	55.3	58.9	60.0	62.9	64.8	67.5
Wyoming	28.9	32.1	41.3	42.2	44.6	44.0	41.9	47.3
Total (bituminous)	**43.9**	**46.8**	**50.7**	**51.7**	**55.0**	**56.4**	**55.5**	**55.9**

[a] Compiled from Mineral Resources, U. S. Geol. Survey.

COMPARISON OF FATALITY RATES IN THE MINERAL INDUSTRY.

Tables 60, 61, and 62 show the number of men employed, average days worked, number killed, and the fatality rate per 1,000 men employed, and also fatality and injury rates per 1,000 300-day workers. This data is given for comparative purposes, showing the relative fatality hazard at coal mines, metal mines, quarries, metallurgical plants, and coke ovens.

TABLE 60.—*Comparison of fatality rates in the mineral industry in the United States.*

	Average days active. (1)	Men employed. (2)	Killed. (3)	Killed per 1,000 employed. (4)[a]	Killed per 1,000 300-day workers. (5)[a]
Coal mines:					
1907	231	680,492	3,242	4.76	6.19
1908	195	690,438	2,445	3.54	5.45
1909	....	666,552	2,642	3.96	....
1910	220	725,030	2,821	3.89	5.31
1911	220	728,348	2,656	3.65	4.97
1912	225	722,662	2,419	3.35	4.46
1913	238	747,644	2,785	3.73	4.70
1914	207	763,185	2,454	3.22	4.66
1915	209	734,008	2,269	3.09	4.44
1916	235	720,971	2,226	3.09	3.94
1917	251	757,317	2,696	3.56	4.25
1918	258	762,426	2,580	3.38	3.94
1919	....	....	2,317	....	....
Metal mines:					
1911	282	165,979	695	4.19	4.45
1912	287	169,199	661	3.91	4.09
1913	288	191,276	683	3.57	3.72
1914	271	158,115	559	3.54	3.92
1915	280	152,118	553	3.64	3.89
1916	282	204,685	697	3.41	3.62
1917	287	200,579	852	4.25	4.44
1918	297	182,606	646	3.54	3.57
1919	281	145,262	468	3.22	3.43
Quarries:					
1911	228	110,954	188	1.69	2.23
1912	249	113,105	213	1.88	2.27
1913	246	106,278	183	1.72	2.10
1914	233	87,936	180	2.05	2.64
1915	246	100,740	148	1.47	1.80
1916	253	90,797	173	1.91	2.26
1917	261	82,290	131	1.59	1.83
1918	260	68,332	125	1.83	2.11
1919	253	75,505	123	1.63	1.93
Metallurgical plants:					
Ore-dressing—					
1913	323	14,985	16	1.07	.99
1914	302	15,128	23	1.52	1.51
1915	309	18,564	30	1.62	1.57
1916	315	22,365	33	1.48	1.41
1917	303	24,111	47	1.95	1.93
1918	310	21,809	35	1.60	1.55
1919	293	17,128	25	1.46	1.50
Smelting—					
1913	355	20,564	47	2.29	1.93
1914	348	27,879	33	1.19	1.02
1915	347	31,327	38	1.21	1.05
1916	338	43,829	36	.82	.73
1917	342	44,376	53	1.19	1.65
1918	342	39,899	42	1.05	.92
1919	326	28,417	32	1.13	1.04

[a] Column 4 gives in the usual way the fatality rate based upon the actual number of employees, regardless of the length of time worked. Column 5 gives a fatality rate based on 1,000 300-day workers. This rate is comparable, one year with another, also one group with another, as the time element has been taken into consideration and all labor equated to a 300-day basis.

TABLE 60.—*Comparison of fatality rates in the mineral industry in the United States*—Continued.

	Average days active. (1)	Men employed. (2)	Killed. (3)	Killed per 1,000 employed. (4)	Killed per 1,000 300-day workers. (5)
Coke ovens:					
Beehive and by-product—					
1913	288	24,345	**46**	**1.89**	**1.97**
1914	286	22,313	**45**	**2.02**	**2.12**
1915	303	31,060	**38**	**1.22**	**1.21**
1916	324	31,603	**45**	**1.42**	**1.32**
1917	329	32,417	**76**	**2.34**	**2.14**
1918	329	32,389	**73**	**2.25**	**2.06**
1919	289	28,741	**53**	**1.84**	**1.92**
Beehive—					
1915	262	17,699	**10**	**.57**	**.65**
1916	300	18,570	**24**	**1.29**	**1.29**
1917	308	18,820	**25**	**1.33**	**1.30**
1918	300	16,442	**19**	**1.16**	**1.16**
1919	244	13,333	**10**	**.75**	**.92**
By-product—					
1915	359	13,361	**28**	**2.10**	**1.75**
1916	357	13,033	**21**	**1.61**	**1.35**
1917	**360**	13,597	**51**	**3.75**	**3.13**
1918	358	15,947	**54**	**3.39**	**2.84**
1919	328	15,408	**43**	**2.79**	**2.55**

TABLE 61.—*United States: Number of men killed per 1,000 300-day workers employed in mineral industries.*

	1911	1912	1913	1914	1915	1916	1917	1918	1919
Coal mines	4.97	4.46	4.70	4.66	4.44	3.93	4.25	3.94	(a)
All metal mines	4.45	4.09	3.72	3.92	3.89	3.62	4.44	3.57	3.43
Copper mines	5.18	4.53	4.08	3.85	3.72	3.64	5.88	3.45	3.54
Gold and miscellaneous metal mines	4.28	4.32	3.83	4.06	4.79	4.05	4.03	4.27	4.41
Iron mines	4.64	3.96	3.29	3.78	2.88	3.41	3.54	3.45	3.00
Lead and zinc mines (Mississippi Valley)	4.03	4.28	3.90	4.32	5.37	3.14	4.09	3.58	4.13
Nonmetallic mineral mines	2.01	1.66	3.02	3.72	2.43	3.00	2.48	1.67	1.65
All quarries (including outside works)	2.23	2.27	2.10	2.64	1.80	2.26	1.83	2.11	1.93
Cement rock quarries	3.96	3.48	2.99	3.95	1.60	2.38	2.99	2.14	2.66
Granite quarries	1.92	1.87	1.47	3.36	2.27	1.86	1.54	2.10	1.81
Limestone quarries	2.21	2.19	2.13	2.38	1.70	2.36	1.79	1.79	1.97
Marble quarries	.71	2.48	1.81	2.72	1.00	1.16	.57	2.14	.51
Sandstone and bluestone quarries	1.82	1.16	1.32	1.45	.93	1.28	.99	2.38	.76
Slate quarries	2.60	2.62	3.05	2.99	2.02	2.62	1.31	3.16	1.78
Trap-rock quarries	1.77	3.08	2.40	2.49	3.46	4.45	2.61	4.47	2.56
All quarries (excluding outside works)					2.17	2.32	2.00	2.19	2.29
All quarries (outside works only)					1.05	2.15	1.53	1.98	1.35
Metallurgical plants:									
Ore-dressing plants			.99	1.51	1.57	1.41	1.93	1.55	1.50
Smelters			1.93	1.02	1.05	.73	1.05	.92	1.04
Auxiliary works						.89	.94	.85	.32
Coke ovens			1.97	2.12	1.21	1.32	2.14	2.06	1.92
Beehive coke ovens					.65	1.29	1.30	1.16	.92
By-products coke ovens					1.75	1.35	3.13	2.84	2.55

[a] Not available.

TABLE 62.—*United States: Number of men injured per 1,000 300-day workers employed in mineral industries.*

	1911	1912	1913	1914	1915	1916	1917	1918	1919
Coal mines									
All metal mines	170.27	190.11	179.59	211.87	248.56	250.64	240.97	237.09	231.18
Copper mines	225.25	258.42	230.80	312.19	322.01	319.58	313.35	322.12	309.60
Gold and miscellaneous metal mines	80.33	93.04	70.37	126.90	201.49	190.79	172.51	185.18	191.29
Iron mines	252.30	241.81	268.31	224.07	233.51	240.17	227.54	185.45	196.19
Lead and zinc mines (Missssissippi Valley)	139.40	158.29	133.51	189.01	238.27	263.09	272.99	319.54	292.28
Nonmetallic mineral mines	34.03	66.40	84.86	99.75	107.78	144.70	123.58	104.69	139.27
All quarries (including outside works)	63.85	69.82	88.81	114.92	117.30	175.62	185.14	147.07	144.20
Cement-rock quarries	136.52	139.59	207.99	226.20	148.25	248.83	277.73	238.65	231.58
Granite quarries	53.07	44.87	69.60	109.21	96.72	143.99	189.73	109.68	124.70
Limestone quarries	67.99	79.98	89.05	114.23	127.43	176.10	175.52	141.34	134.05
Marble quarries	43.39	42.35	68.67	121.31	93.80	125.20	100.20	58.02	75.26
Sandstone and bluestone quarries	34.68	45.26	74.36	69.08	66.56	127.86	118.89	148.04	131.96
Slate quarries	17.72	15.01	18.81	28.61	33.08	85.00	112.04	96.29	98.51
Trap-rock quarries	69.76	68.89	87.77	152.56	232.85	237.84	222.92	205.17	186.47
All quarries (excluding outside works)					127.57	158.63	162.95	148.29	146.65
All quarries (outside works only)					96.90	206.06	223.81	145.03	140.28
Metallurgical plants:									
Ore-dressing plants			122.38	94.19	109.65	135.66	121.12	139.54	122.82
Smelters			174.71	175.44	157.69	195.61	152.88	148.40	142.12
Auxiliary works						142.10	169.33	139.63	102.04
Coke ovens			107.73	103.06	90.78	153.49	188.59	219.64	145.66
Beehive coke ovens					39.84	100.37	94.43	131.11	125.96
By-product coke ovens					140.00	217.09	300.06	296.06	158.33

PERMISSIBLE LAMPS AND MINING EQUIPMENT.

As a result of the bureau's educational campaign for safety at mines and the reduction of mine accidents, coal mines are using explosives and equipment that have passed certain specified tests conducted by the bureau's engineers.

The following schedules cover the tests that lamps and mining equipment must pass in order to be approved for use in gaseous and dusty mines: Schedule 2A[a] for electrical equipment, such as motors and coal-cutting machines; Schedule 6A[b] for portable electric lamps; Schedule 7[c] for flame safety lamps; Schedule 12[d] for single-shot blasting units; and Schedule 13[e] or testing rescue breathing apparatus.

The various schedules named above, stating the conditions and requirements[f] under which these permissible devices are tested, may be obtained by application to the Director, Bureau of Mines, Washington, D. C.

APPROVED MINE-RESCUE BREATHING APPARATUS.

By D. J. Parker.

The Gibbs mine-rescue and breathing apparatus, manufactured by the Mine Safety Appliances Co., 909 Chamber of Commerce Building, Pittsburgh, Pa., and the Paul mine-rescue breathing apparatus, manufactured by the American Atmos Co., Wilkinsburg Station, Pittsburgh, Pa., were approved January 15, 1920, as permissible for use in irrespirable and poisonous gases in accordance with Schedule 13. Approval numbers 1300 and 1301 were assigned to the Gibbs and Paul apparatus, respectively.

Approvals of each apparatus were made contingent upon certain modifications which had been incorporated in the apparatus as tested at the bureau.

Approval No. 1300.—The Gibbs apparatus modifications are:

1. *Regenerator.*—Baffle plate is placed in regenerator so as to form a partial partition, as shown in drawing D 254 of December 4, 1919.

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[a] Procedure for establishing a list of permissible explosion-proof electric motors for mines: fees, character of tests, and conditions under which motors will be tested: Schedule 2A, Bureau of Mines, 1915, 11 pp.

[b] Procedure for establishing a list of permissible portable electric mine lamps: fees, character of tests, and conditions under which lamps will be tested: Schedule 6A, Bureau of Mines, 1915, 13 pp.

[c] Procedure for establishing a list of permissible miners' safety lamps; character of tests, conditions under which lamps will be tested, and fees: Schedule 7, Bureau of Mines, 1915, 10 pp.

[d] Procedure for establishing a list of permissible single-shot blasting units; character of tests, conditions under which units will be tested, and fees, Schedule 12, Bureau of Mines, 1919.

[e] Procedure for establishing a list of permissible self-contained mine-rescue breathing apparatus. Schedule 13, Bureau of Mines, 1919.

[f] All approved equipment must be identified by a plate bearing the seal of the Department of the Interior, Bureau of Mines, and the statement and number of the approval. Equipment that is not so identified is not considered as approved.

2. *Reducing valve.*—Lug is attached on valve arm steel to prevent knife edges from going over dead center, as shown in drawing B 541 of November 5, 1919.

3. *Reducing valve.*—A square head and square socket lock is made on screw connected to bellows, as per drawing D 541 of November 5, 1919.

4. *Reducing valve.*—A lock is placed on adjusting screw, as per drawing B 541 of November 5, 1919.

5. *Pressure gage closing valve* is made a needle-point closing valve, as shown on drawing B 541 of November 5, 1919.

APPROVAL No. 1301.—The Paul apparatus modifications are:

1. *Closing valve lock.*—A chain fastened to the metal frame of the apparatus connects to eyelet on wheel of closing valve stem only when valve is open.

2. *Safety valve in saliva trap.*—A supplemental mica disk valve is placed in saliva trap in such manner that it is open at all times during exhalation and closes during inhalation. This is for the purpose of preventing drawing in of air from the outside atmosphere.

3. *Pressure gage.*—Dial of pressure gage is graduated in divisions of 25 atmospheres, with figures and markings that are clearly legible.

4. *Pressure gage valve.*—Pressure gage valve is placed in proximity to closing valve in such manner that it can be readily manipulated by wearer.

5. *Regenerator.*—Air courses through regenerating material are enlarged and metal partition in back of canister is eliminated.

6. *Breathing bag.*—Adjustment of closing of automatic valve in breathing bag is so made that undue resistance on account of excess pressure in bag upon exhalation is eliminated.

With both apparatus formal recommendation is made that by-pass valve and connection, as placed on the apparatus tested by the bureau, be made a part of all these apparatus manufactured in the future. It is believed that very shortly all Gibbs and Paul apparatus will have such by-pass, and it will be the bureau's policy to equip all its apparatus with by-pass valve and connections as soon as time permits.

Both approvals cover only apparatus identical in construction and material with the full-size working models of each retained at Pittsburgh station for reference.

Steps are being taken by other manufacturers of breathing apparatus toward the testing of their apparatus by the bureau in accordance with Schedule 13.

REGENERATORS.

The M. S. A. refillable regenerator for use with the Gibbs self-contained mine rescue breathing apparatus has been approved as permissible for use in irrespirable and poisonous gases in accordance with Schedule 13, subject to the following provisions:

1. Regenerator shall be considered to have the bureau's approval only when identical in all respects with the full-size working model retained at the Bureau of Mines experiment station, Pittsburgh, Pa., and only when used with that particular type of Gibbs self-contained mine rescue breathing apparatus approved by the bureau. Regenerator shall correspond in all respects to drawing M. S. A. No. 1, dated January 10, 1920.

2. Regenerating material or "cardoxide" used in this refillable regenerator shall be identical in all respects with the regenerating material furnished by the Mine Safety Appliances Co., Pittsburgh, Pa., and used in the series of tests to which the regenerator was subjected.

3. Four pounds of this regenerating material shall be used in regenerator. This shall be divided so that approximately 2 pounds are placed in each of the two compartments of the regenerator.

PERMISSIBLE LAMPS AND MINING EQUIPMENT APPROVED PRIOR TO FEBRUARY 1, 1921.

By L. C. Ilsley.

EXPLOSION-PROOF COAL-CUTTING EQUIPMENT.

In accordance with Schedule 2A, the following coal-cutting equipment has the bureau's approval:

Approval No. 100, covering a 250-volt direct-current explosion-proof coal-cutting equipment manufactured by the Sullivan Machinery Co., Claremont, N. H.

Approval No. 100A, covering a 500-volt direct-current explosion-proof coal-cutting equipment manufactured by the Sullivan Machinery Co., Claremont, N. H.

Approval No. 101, covering a 210-volt direct-current explosion-proof coal-cutting equipment manufactured by the Goodman Manufacturing Co., Chicago, Ill.

Approval No. 101A, covering a 500-volt direct-current explosion-proof coal-cutting equipment manufactured by the Goodman Manufacturing Co., Chicago, Ill.

Approval No. 102, covering a 250-volt direct-current explosion-proof coal-cutting equipment manufactured by the Jeffrey Manufacturing Co., Columbus, Ohio.

Approval No. 102A, covering a 500-volt direct-current explosion-proof coal-cutting equipment manufactured by the Jeffrey Manufacturing Co., Columbus, Ohio.

Approval No. 103, covering a 250-volt direct-current explosion-proof coal-cutting equipment manufactured by the Jeffrey Manufacturing Co., Columbus, Ohio.

Approval No. 103A, covering a 500-volt direct-current explosion-proof coal-cutting equipment manufactured by the Jeffrey Manufacturing Co., Columbus, Ohio.

Approval No. 104, covering a 220-volt alternating-current explosion-proof coal-cutting equipment manufactured by the Sullivan Machinery Co., Claremont, N. H.

Approval No. 104A, covering a 440-volt alternating-current explosion-proof coal-cutting equipment manufactured by the Sullivan Machinery Co., Claremont, N. H.

Approval No. 105, covering a 210-volt direct-current explosion-proof coal-cutting equipment manufactured by the Goodman Manufacturing Co., Chicago, Ill.

Approval No. 105A, covering a 500-volt direct-current explosion-proof coal-cutting equipment manufactured by the Goodman Manufacturing Co., Chicago, Ill.

PERMISSIBLE PORTABLE ELECTRIC MINE LAMPS.[a]

In accordance with Schedule 6A, approval No. 10 has been issued covering a permissible portable electric mine lamp manufactured by the Edison Storage Battery Co., Orange, N. J., to be used with a flexible cord identified by the bureau's specification CD–17. The only bulbs approved for use with this lamp are the symbol BM–10 bulbs, manufactured by the National Lamp Works of the General Electric Co., Cleveland, Ohio; the symbol BM–10 bulbs, manufactured by the Edison Works of the General Electric Co., Harrison, N. J.; the symbol 26–V bulbs, manufactured by the Miniature Incandescent Lamp Corporation, 95 Eighth Avenue, Newark, N. J.; and the symbol BM-10 bulbs, manufactured by the Westinghouse Lamp Co., Bloomfield, N. J.

Approval No. 12 covers the Concordia permissible portable electric (hand lamp) mine lamp, manufactured by the Concordia Electric Co., Pittsburgh, Pa. The only bulbs approved for use with this lamp are the symbol Osram, 08510 bulbs, sold by the Concordia Electric Co.

Approval No. 14 covers the Wico permissible portable electric mine lamp, manufactured by the Witherbee Igniter Co., Springfield, Mass., to be used with a flexible cord identified by the bureau's specification

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[a] Unless otherwise specified all lamps are cap lamps.

CD–43. The only bulbs approved for use with this lamp are the symbol BM–14 bulb, manufactured by the Edison Lamp Works of the General Electric Co., Harrison, N. J.

Approval No. 15 covers the Concordia permissible portable electric mine lamp, manufactured by the Concordia Electric Co., Pittsburgh, Pa., to be used with a flexible cord identified by the bureau's specification CD–17. The only bulbs approved for use with this lamp are the BM–15 bulbs, manufactured by the National Lamp Works of the General Electric Co., Cleveland, Ohio.

Approval No. 16 covers the Pioneer permissible portable electric mine lamp, manufactured by the Pioneer Electric Mine Lamp Co., Philadelphia, Pa., to be used with a flexible cord identified by the bureau's specification No. CD–31, and with battery plates, manufactured by the Electric Storage Battery Co., Philadelphia, Pa. The only bulbs approved for use with this lamp are the BM–16 bulbs, manufactured by the Edison Lamp Works of the General Electric Co., Harrison, N. J.

Approval No. 17 covers the Wheat permissible portable electric mine lamp, manufactured by the Koehler Manufacturing Co. (Inc.), Marlboro, Mass., to be used with a flexible cord identified by the bureau's specification CD–31, and with battery plates, manufactured by the General Lead Battery Co., Newark, N. J. The only bulbs approved for use with this lamp are the BM–17 bulbs manufactured by the National Lamp Works of the General Electric Co., Cleveland, Ohio.

PERMISSIBLE MINERS' (FLAME) SAFETY LAMPS.

In accordance with Schedule 7, the following flame safety lamps have been approved by the bureau:

Approval No. 201 covers a flat-wick steel-frame lamp manufactured by the Koehler Manufacturing Co., Marlboro, Mass.

Approval No. 201–A covers a round-wick steel-frame lamp manufactured by the Koehler Manufacturing Co., Marlboro, Mass.

Approval No. 202 covers a flat-wick steel-frame lamp manufactured by Ackroyd & Best (Ltd.), Arrott Power Building, Pittsburgh, Pa.

Approval No. 203 covers a flat-wick aluminum-frame lamp manufactured by the Koehler Manufacturing Co., Marlboro, Mass.

Approval No. 203–A covers a round-wick aluminum-frame lamp manufactured by the Koehler Manufacturing Co., Marlboro, Mass.

Approvals Nos. 201, 201–A, 203, and 203–A apply only to *magnetic lock* lamps that are equipped with steel gauzes. The only glasses approved for use with these lamps are marked "Macbeth No. 2100 High Speed." The only igniter approved for use with these lamps are the Koehler pyro internal igniter, 1915 model, using a cerium-zinc-copper alloy for igniter points.

Approval No. 202 applies to a magnetic lock lamp. The only glasses approved for use with this lamp are marked as follows:

ACK$^{\text{D}}$
BEST
A–1

This lamp is relighted electrically. The only relighter approved for this lamp is the Ackroyd & Best underground relighter.

PERMISSIBLE SINGLE-SHOT BLASTING UNIT.

In accordance with Schedule 12, approval No. 1200 has been issued covering a single-shot blasting unit manufactured by the Mine Safety Applicances Co., Pittsburgh, Pa., for safety, reliability, and durability.

PERMISSIBLE EXPLOSIVES TESTED PRIOR TO FEB. 1, 1921.

By Spencer P. Howell.

GENERAL STATEMENT.

In the table following are the brand names of all explosives now considered as permissible explosives that were tested by the Bureau of Mines prior to February 1, 1921.

Further information on permissible explosives may be found in other Bureau of Mines publications.[a] The precautions to be observed in the handling, storage, and use of permissible explosives are found in Miner's Circular 6. The conditions to be fulfilled by applicants desiring explosives tested to determine their permissibility for use in coal mines are stated in Schedule 1–A. A description of the tests made, the apparatus used for such tests, and detailed results of tests of 100 permissible explosives are given in Bulletins 15 and 66. The

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[a] Hall, Clarence, Permissible explosives tested prior to Jan. 1, 1912, and precautions to be taken in their use: Miner's Circular 6, Bureau of Mines, 1912, 20 pp.: Fees for testing explosives: Schedule 1–A, Bureau of Mines, 1920: Hall, Clarence, Snelling, W. O., and Howell, S. P., Investigations of explosives used in coal mines: Bull. 15, Bureau of Mines, 1911, 191 pp.: Hall, Clarence, and Howell, S. P., Tests of permissible explosives: Bull. 66, Bureau of Mines, 1913, 313 pp.; Munroe, C. E., and Hall, Clarence, A primer on explosives for coal miners: Bull. 17, Bureau of Mines, 1911, 61 pp.: Rutledge, J. J., and Hall, Clarence, The use of permissible explosives: Bull. 10, Bureau of Mines, 1912, 34 pp.: Storm, C. G., The analysis of permissible explosives: Bull. 96, Bureau of Mines, 1916, 88 pp.; Rutledge, J. J., The use and misuse of explosives in coal mining: Miner's Circular 7, Bureau of Mines, 1913, 52 pp.; Howell, S. P., and Tiffany, J. E., Methods for routine work in the explosives physical laboratory of the Bureau of Mines: Tech. Paper 186, Bureau of Mines, 1918, 63 pp.

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storage, handling, and use of permissible explosives are discussed in Bulletins 10 and 17 and Miner's Circular 7, and the methods used by the bureau in the analysis of permissible explosives and the tolerances for permissible explosives as promulgated by the Bureau of Mines on July 1, 1915, are detailed in Bulletin 96, and on November 15, 1920, and effective from that date the Director of the Bureau of Mines promulgated certain changes in the rules and regulations governing the testing of permissible explosives, as recommended by the bureau's committee on permissible explosives. The tolerances as now existing are given on pages 101, 102, and 103. These rules also provide for the transferring of permissible explosives from the active (published) list to the inactive (not published) list. Explosives will be placed on the inactive list at the request of the manufacturer or if they have not been manufactured during any calendar year.

Additions to the active and inactive list of permissible explosives will be published in future issues of the Monthly Statement of Coal-Mine Fatalities in the United States, which contains also lists of miners' electric lamps and other devices approved by the Bureau of Mines. A complete list of permissible explosives with pertinent data and full descriptive text will be published as an appendix to the same publication at reasonable intervals of from 6 to 12 months.

There were 152 explosives on the permissible list on January 1, 1917.[a] During the succeeding 49 months 72 explosives were added to the list, 76 explosives were dropped from the permissible list and placed on the inactive list of permissible explosives. The present list takes the place of all preceding lists and includes a total of 148 explosives.

DEFINITION OF A PERMISSIBLE EXPLOSIVE.

An explosive is called a permissible explosive when it is similar in all respects to the sample that passed certain tests by the Federal Bureau of Mines, and when it is used in accordance with the conditions prescribed by this bureau. But even the explosives that have passed these tests and are named in this list as permissible explosives are to be considered permissible explosives only when used under the following conditions:

1. That the explosive is in all respects similar to the sample submitted by the manufacturer for test.

2. That detonators—preferably electric detonators—are used of not less efficiency than those prescribed, namely, those consisting by weight of 90 parts of mercury fulminate and 10 parts of potassium chlorate (or their equivalents).

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[a] Howell, S. P., Permissible explosives tested prior to Jan. 1, 1917: Tech. Paper 169, Bureau of Mines, 1917, 19 pp.

3. That the explosive, if frozen, shall be thoroughly thawed in a safe and suitable manner before use.

4. That the quantity used for a shot does not exceed 1½ pounds (680 grams), and that it is properly tamped with clay or other noncombustible stemming.

After an explosive has passed the required tests and its brand name has been published in a list of permissible explosives, it is not a permissible explosive if one or more of any of the following conditions prevail:

1. If kept in a moist place until it undergoes a change in character.
2. If used in a frozen or partly frozen condition.
3. If used in excess of 1½ pounds (680 grams) per shot.
4. If the diameter of the cartridge is less than that designated in the column "smallest permissible diameter."
5. If fired with a detonator or electric detonator of less efficiency than that prescribed.
6. If fired without stemming.
7. If fired with combustible stemming.

Moreover, even when all of the prescribed conditions have been met, no explosive on the permissible list should necessarily be considered as being *permanently* a permissible explosive, for the bureau reserves the right, on fuller information concerning the conditions that lead to safety, to revise this list; but any permissible explosive when used under the prescribed conditions may properly continue to be considered a permissible explosive until notice of its withdrawal or removal from the list has been officially published, or until its name is omitted from a later list published by the Bureau of Mines.

After further experiments and conferences the Bureau of Mines may find it advisable to adopt additional and more severe tests to which all permissible explosives may be subjected, in the hope that through the use of such explosives only as pass the more severe tests the lives of miners may be better safeguarded.

LIST OF PERMISSIBLE EXPLOSIVES.

Subject to the conditions and provisions stated herein, the following explosives are classed as permissible explosives.

Permissible explosives tested prior to February 1, 1921.

Brand.	Class designation basis.		When used with detonators, preferably electric detonators, of not less efficiency than—	Weight of 1¼ by 8 inch cartridge.	Smallest permissible diameter.	Percentage strength as determined by ballistic pendulum. [a]	Rate of detonation in 1¼-inch diameter cartridges.		Manufacturer.
	Volume of poisonous gases.	Characteristic ingredient.							
1	2	3	4	5	6	7	8		9
				Grams.	*Inches.*	*Per cent.*	*Feet per second.*	*Meters per second.*	
Aetna coal powder A	C	4	No. 6	184	1¼	82	12,620	3,848	Aetna Explosives Co. (Inc.), New York, N. Y.
Aetna coal powder AA	A	1a	do	[b] 214	1¼	94	7,880	2,403	Do.
Aetna coal powder B	C	4	do	179	1¼	75	9,870	3,008	Do.
Aetna coal powder B+	C	do	do	192	1¼	79	9,760	2,977	Do.
Aetna coal powder C	B	do	do	198	1¼	66	7,010	2,138	Do.
Aetna coal powder 2	A	1a	do	186	1⅛	107	9,280	2,830	Do.
Austin Red Diamond No. 1-A [c]	B	do	do	179	1¼	105	11,700	3,568	Austin Powder Co., Cleveland, Ohio.
Austin Red Diamond No. 2-A [c]	B	do	do	178	⅞	95	9,870	3,009	Do.
Austin Red Diamond No. 3-A [c]	B	do	do	174	⅞	93	7,260	2,212	Do.
Austin Red Diamond No. 4-A [c]	B	do	do	174	⅞	92	8,980	2,738	Do.
Austin Red Diamond No. 5-A [c]	B	do	do	179	1	85	6,760	2,061	Do.
Austin Red Diamond No. 6-A [c]	B	do	do	175	⅞	104	10,380	3,165	Do.
Austin Red Diamond No. 1-G [d]	C	4	do	226	1¼	81	10,950	3,338	Do.
Austin Red Diamond No. 2-G [d]	C	do	do	170	1¼	75	11,380	3,470	Do.
Austin Red Diamond No. 3-G [d]	C	do	do	174	1¼	70	8,710	2,656	Do.
Austin Red Diamond No. 6-G [d]	C	do	do	175	⅞	66	7,490	2,285	Do.
Austin Red Diamond No. 1-D [e]	B	1a	do	146	⅞	107	10,960	3,341	Do.
Big Red No. 1	B	do	do	171	⅞	95	7,250	2,209	The Equitable Powder Manufacturing Co., and the Egyptian Powder Co., East Alton, Ill.
Big Red No. 2	B	do	do	166	⅞	89	10,850	3,309	Do.
Big Red No. 6, L. F	B	do	do	174	⅞	94	7,480	2,280	Do.
Big Red No. 7	A	do	do	186	⅞	100	10,000	3,050	Do.
Bituminite 1	C	4	do	187	1¼	71	12,800	3,901	Aetna Explosives Co. (Inc.), New York, N. Y.
Bituminite 4	C	do	do	178	1¼	75	7,540	2,298	Do.
Bituminite 5	A	1a	do	176	1¼	98	9,120	2,782	Do.
Bituminite 8, L. F	C	4	do	155	1¼	75	9,300	2,834	Do.
Black Diamond No. 2-A	C	do	do	190	1¼	81	12,600	3,842	Illinois Powder Manufacturing Co., St. Louis, Mo.
Black Diamond No. 3-A	C	do	do	156	1¼	77	11,160	3,402	Do.
Black Diamond No. 5	A	1a	do	180	1¼	79	6,020	1,835	Do.
Black Diamond No. 6, L. F	C	4	do	158	1¼	74	9,630	2,935	Do.

Black Diamond No. 7	A	1a	do	183	1¼	106	10,730	3,270	Do.
Cameron mine powder **No. 1-A**	A	do	do	156	1¼	100	10,950	3,339	Grasselli Powder Co., Cleveland, Ohio.
Carbonite No. 1	C	4	do	226	1¼	81	10,950	3,338	E. I. du Pont de Nemours & Co., Wilmington, Del.
Carbonite No. 2	C	do	do	170	1¼	75	11,380	3,470	Do.
Carbonite No. 3	C	do	do	174	1¼	70	8,710	2,656	Do.
Carbonite No. 5	C	do	do	175	7/8	75	10,140	3,092	Do.
Carbonite No. 6	C	do	do	175	7/8	66	7,490	2,285	Do.
Coalite A, L. F	A	1a	do	164	7/8	111	11,590	3,534	Atlas Powder Co., Wilmington, Del., and the Giant Powder Co. (Con.), Giant, Calif.
Coalite B, L. F	A	do	do	147	7/8	111	11,390	3,474	Do.
Coalite C, L. F	A	do	do	166	7/8	106	12,190	3,716	Do.
Coalite D, L. F	A	do	do	154	7/8	106	12,070	3,680	Do.
Coalite E, L. F	A	do	do	168	7/8	96	6,220	1,896	Do.
Coalite F, L. F	A	do	do	162	7/8	63	4,640	1,414	Do.
Coalite G, L. F	A	do	do	151	7/8	104	7,970	2,430	Do.
Coalite H, L. F	A	do	do	184	1	87	6,350	1,936	Do.
Coalite I, L. F	A	do	do	164	7/8	85	9,240	2,816	Do.
Coalite Y	B	do	do	164	7/8	97	10,300	3,141	Do.
Coalite No. 1	C	4	do	232	1¼	77	7,930	2,418	Do.
Coalite No. 2-D	B	do	do	233	1¼	73	8,430	2,571	Do.
Coalite No. 2-M, L. F	C	do	do	157	1¼	75	9,220	2,811	Do.
Coal special 1-A	C	4	do	148	1¼	82	9,370	2,857	Aetna Explosives Co. (Inc.), New York, N. Y.
Coal special 1, L. F	C	do	do	150	1¼	82	8,280	2,524	Do.
Coal special 2-W	C	do	do	180	1¼	82	11,590	3,534	Do.
Coal special 3-C	C	do	do	192	1¼	79	9,760	2,977	Do.
Collier A	A	1a	do	160	7/8	106	11,280	3,440	Do.
Collier B	B	do	do	156	7/8	110	10,970	3,345	Do.
Collier KN	A	do	do	175	1⅛	102	11,610	3,539	Do.
Collier Y	A	do	do	172	1¼	99	9,740	2,970	Do.
Collier X, I. F. 1	B	do	do	164	7/8	96	8,140	2,483	Do.
Collier X, I. F. 2	A	do	do	165	7/8	100	9,950	3,035	Do.
Collier 5	A	do	do	178	1¼	95	8,280	2,524	Do.
Collier 5, special	A	do	do	180	1⅛	96	8,330	2,541	Do.
Collier 6	A	do	do	169	7/8	106	11,220	3,422	Do.
Collier 11	A	do	do	165	7/8	105	11,680	3,561	Do.
Collier 11, L. F	B	do	do	180	1¼	100	10,850	3,307	Do.
Cronite No. 1	A	do	do	149	1¼	97	10,490	3,198	G. R. McAbee Powder & Oil Co., Pittsburgh, Pa.
Duobel	B	do	do	146	7/8	107	10,960	3,341	E. I. du Pont de Nemours & Co., Wilmington, Del.
Du Pont Permissible No. 1	B	do	do	175	7/8	82	9,610	2,930	Do.
Franklinite 1	C	4	do	192	1¼	79	9,760	2,977	Aetna Explosives Co. (Inc.), New York, N. Y.
Franklinite 4	B	do	do	198	1¼	66	7,010	2,138	Do.
General A	C	4	do	204	1⅛	83	13,500	4,116	General Explosives Co., Joplin, Mo.
General B	C	4	do	187	1¼	76	10,640	3,244	Do.
General C	B	do	do	186	1⅛	75	10,460	3,190	Do.
General 1	A	1a	do	168	7/8	109	10,650	3,247	Do.
General 2	A	do	do	152	7/8	105	11,510	3,508	Do.

[a] **Pittsburgh Testing Station** standard **40 per cent straight** nitroglycerin dynamite with a percentage strength of 100 per cent as the basis of these values.
[b] 1½ by 8 inch cartridge.
[c] Same as Monobel Nos. 1 to 6, inclusive, respectively.
[d] Same as Carbonite Nos. 1, 2, 3, and 6, respectively.
[e] Same as Duobel.

Permissible explosives tested prior to February, 1, 1921—Continued.

Brand.	Class designation basis.		When used with detonators, preferably electric detonators, of not less efficiency than—	Weight of 1¼ by 8 inch cartridge.	Smallest permissible diameter.	Percentage strength as determined by ballistic pendulum.[a]	Rate of detonation in 1¼-inch diameter cartridges.		Manufacturer.
	Volume of poisonous gases.	Characteristic ingredient.							
1	2	3	4	5	6	7	8		9
				Grams.	*Inches.*	*Per cent.*	*Feet per second.*	*Meters per second.*	
General 3	B	1a	No. 6	169	⅞	107	8,150	2,486	General Explosives Co., Joplin, Mo.
General 3-X	A	do	do	203	1⅛	99	8,950	2,730	Do.
General 4	A	do	do	170	⅞	100	10,920	3,330	Do.
General 4-X	A	do	do	162	⅞	101	10,760	3,280	Do.
General 5	A	do	do	194	1⅛	103	10,510	3,204	Do.
General 5 X	A	do	do	172	1	83	6,600	2,013	Do.
General 6	B	do	do	154	⅞	103	12,050	3,674	Do.
General 6 X	A	do	do	194	1⅛	103	10,510	3,204	Do.
Grasselli A	B	4	do	183	1¼	77	11,290	3,443	Grasselli Powder Co., Cleveland, Ohio.
Grasselli B	C	do	do	168	1¼	67	9,540	2,908	Do.
Grasselli No. 1	A	1	do	156	1¼	100	10,950	3,339	Do.
Grasselli No. 5	A	do	do	161	1¼	94	8,720	2,658	Do.
Grasselli No. 6	B	do	do	169	1¼	101	8,090	2,467	Do.
Lomite No. 1	B	2	do	176	1¼	76	13,940	4,250	G. R. McAbee Powder & Oil Co., Pittsburgh, Pa.
McAbee X	A	1a	do	156	1⅛	105	10,500	3,200	McAbee Powder & Oil Co., Pittsburgh, Pa.
McAbee Y	B	do	do	149	1⅛	100	10,850	3,307	Do.
McAbee Z	A	do	do	151	1⅛	107	10,610	3,234	Do.
Mine-ite A	B	4	do	183	1¼	77	11,290	3,443	Grasselli Powder Co., Cleveland, Ohio.
Mine-ite B	C	do	do	168	1¼	67	9,540	2,908	Do.
Mine-ite No. 5–D	A	1a	do	161	1¼	94	8,720	2,658	Do.
Mine-ite No. 6–D	B	do	do	169	1¼	101	8,090	2,467	Do.
Miners Friend No. 1	B	do	do	167	⅞	102	11,580	3,529	Atlas Powder Co., Wilmington, Del.
Miners Friend No. 2	B	do	do	166	⅞	94	10,330	3,149	Do.
Miners Friend No. 3	B	do	do	167	⅞	94	8,030	2,449	Do.
Miners Friend No. 4	B	do	do	166	⅞	91	9,980	3,044	Do.
Miners Friend No. 5	B	do	do	166	⅞	91	8,570	2,614	Do.
Miners Friend No. 6	B	do	do	166	⅞	101	10,900	3,324	Do.
Miners Friend No. 7	A	do	do	176	⅞	90	8,950	2,729	Do.
Monobel Y	B	do	do	168	⅞	98	9,300	2,835	E. I. du Pont de Nemours & Co., Wilmington, Del.
Monobel No. 1	B	do	do	179	1¼	105	11,700	3,568	Do.

Monobel No. 2	B	do.	do.	178	⅞	95	9,870	3,009	Do.
Monobel No. 3	B	do.	do.	174	⅞	93	7,260	2,212	Do.
Monobel No. 4	B	do.	do.	174	⅞	92	8,980	2,738	Do.
Monobel No. 5	B	do.	do.	179	1	85	6,760	2,061	Do.
Monobel No. 6	B	do.	do.	175	⅞	104	10,380	3,165	Do.
Monobel No. 7	B	do.	do.	180	⅞	108	10,050	3,065	Do.
Nitro low-flame No. 1	C	4	do.	234	1¼	75	13,380	4,079	Nitro Powder Co., Kingston, N. Y.
Nitro low-flame No. 2	C	do.	do.	226	1¼	76	14,560	4,439	Do.
Red H No. 1	B	1a	do.	167	1¼	105	11,700	3,568	Hercules Powder Co., Wilmington, Del.
Red H No. 2	B	do.	do.	160	⅞	95	9,870	3,009	Do.
Red H No. 3	B	do.	do.	173	⅞	93	7,260	2,212	Do.
Red H No. 4	B	do.	do.	164	⅞	92	8,980	2,738	Do.
Red H No. 5	B	do.	do.	170	1	85	6,760	2,061	Do.
Red H No. 6	B	do.	do.	162	⅞	104	10,380	3,165	Do.
Red H No. 7	B	do.	do.	180	⅞	108	10,050	3,065	Do.
Red H No. 11	B	do.	do.	151	⅞	108	11,090	3,381	Do.
Red H No. 14	B	do.	do.	151	⅞	96	10,470	3,192	Do.
Trojan coal powder I	A	3	do.	218	1¼	55	9,620	2,934	Pennsylvania Trojan Powder Co., Allentown, Pa.
Trojan coal powder J	A	do.	do.	229	1¼	63	10,590	3,230	Do.
Trojan coal powder L	B	do.	do.	166	1⅛	83	10,560	3,221	Do.
Trojan coal powder M-1	A	do.	do.	188	1	98	10,590	3,228	Do.
Trojan coal powder M-2	A	do.	do.	178	1	98	10,650	3,248	Do.
Trojan coal powder M-3	A	do.	do.	184	1	99	12,010	3,663	Do.
Trojan coal powder M-4	A	do.	do	180	1	107	12,280	3,745	Do.
Trojan granular coal powder No. 1	A	do.	do.	b 247	1⅞	86	c 7,920	c 2,416	Do.
Tunnelite AA	A	1a	do.	176	1⅛	90	7,690	2,346	G. R. McAbee Powder & Oil Co., Pittsburgh, Pa.
Tunnelite B	B	do.	do.	167	1⅛	91	9,990	3,047	Do.
Tunnelite C	A	do.	do.	187	1⅛	89	10,060	3,068	Do.
Tunnelite No. 3	C	4	do.	150	1⅛	78	10,110	3,083	Do.
Tunnelite No. 4	C	do.	do.	136	1⅛	73	10,620	3,238	Do.
Tunnelite No. 6	C	do.	do.	172	1¼	74	9,670	2,947	Do.
Tunnelite No. 8	C	do.	do.	158	1¼	70	8,020	2,446	Do.
Tunnelite No. 8, L. F.	C	do.	do.	176	1¼	70	8,720	2,658	Do.
Union A, L. F.	B	1*a*	do.	165	1⅛	106	11,670	3,557	Union Explosives Co., Clarksburg, W. Va.
Union B, L. F.	B	do.	do.	162	1⅛	92	10,260	3,128	Do.
Union C, L. F.	B	do.	do.	169	1⅛	89	10,330	3,149	Do.
Union No. 1	C	4	do.	183	1⅛	81	11,640	3,548	Do.
Vigorite No. 1	C	do.	do.	204	1¼	88	10,950	3,338	Atlas Powder Co., Wilmington, Del., and the Giant Powder Co. (Con.), Giant, Calif.
Vigorite No. 5	C	do.	do.	165	⅞	75	10,830	3,303	Do.
Vigorite No. 6	C	do.	do.	166	⅞	66	7,490	2,285	Do.
Xpdite No. 1	C	do.	do.	211	1¼	88	10,950	3,338	Hercules Powder Co., Wilmington, Del.
Xpdite No. 2	C	do.	do.	168	1¼	75	11,380	3,470	Do.
Xpdite No. 3	C	do.	do.	162	1¼	70	8,710	2,656	Do.
Xpdite No. 6	C	do.	do.	165	⅞	66	7,490	2,285	Do.

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[a] Pittsburgh Testing Station standard 40 per cent straight nitroglycerin dynamite, with a percentage strength of 100 per cent as the basis of these values.
[b] 1⅞ by 8 inch cartridge.
[c] 1¼-inch diameter cartridge.

CLASSES OF PERMISSIBLE EXPLOSIVES.

In order that the user of explosives may be able the better to select an explosive to meet a specific requirement the Bureau of Mines now classifies permissible explosives in two ways, as follows: (1) On the basis of the volume of poisonous gases produced by 1½ pounds (680 grams) of the explosive, and (2) on the basis of the characteristic ingredient of each explosive.

VOLUME OF POISONOUS GASES.

Most of the permissible explosives even when properly and completely detonated in a drill hole in a coal mine produce poisonous gases, but they produce at the same time a much larger volume of nonpoisonous gases. In order that the poisonous gases may not under normal conditions become a menace to the lives or health of miners no explosive is now or can become permissible if it evolves upon detonation more than 158 liters (5½ cubic feet) of permanent poisonous gases, as determined by test in the Bichel pressure gage. Field tests of an explosive made under extreme conditions for the production of the greatest percentage of poisonous gases in the air show that in a narrow entry, with no ventilation at or near the face, a 1½-pound charge of an explosive, which gave 158 liters of poisonous gas in gage tests, produced 0.18 per cent of carbon monoxide (the only poisonous gas present) in the air when the sample was taken two minutes after the shot. Another sample of the air taken two minutes later contained 0.08 per cent of carbon monoxide. It is therefore evident that where ventilation is not active, as in a closed heading, miners or shot firers should not return to the face until at least five minutes after a shot. At all working faces that are difficult to ventilate explosives of class A or class B should be used, preferably those of class A.

The classification on the basis of the volume of poisonous gases produced by 1½ pounds (680 grams) of the explosive is as follows:

Class A, those explosives from which the volume of poisonous gases produced is not more than 53 liters.

Class B, those explosives from which the volume of poisonous gases is more than 53 liters but less than 106 liters, inclusive.

Class C, those explosives in which the volume of poisonous gases is more than 106 liters but less than 158 liters, inclusive.

CHARACTERISTIC INGREDIENTS.

Explosives are classified in accordance with their characteristic ingredient as follows:

Class 1, ammonium nitrate explosives.—To class 1 belong all the explosives in which the characteristic ingredient is ammonium nitrate.

This class is divided into two subclasses. Subclass A includes every ammonium nitrate explosive that contains a sensitizer that is in itself an explosive. Subclass B includes every ammonium nitrate explosive that contains a sensitizer that is not in itself an explosive. The ammonium nitrate explosives of subclass A consist principally of ammonium nitrate with small percentages of nitroglycerin, nitrocellulose, or nitrosubstitution compounds which are used as sensitizers. The ammonium nitrate explosives of subclass B consist principally of ammonium nitrate with small percentages of resinous matter or other nonexplosive substances used as sensitizers.

Ammonium nitrate explosives, when fresh and properly detonated, are well adapted for use in mines that are not unusually wet. They are not suitable for use in wet mines, for if the contents of a cartridge of ammonium nitrate explosive is exposed for only a few hours to the damp atmosphere the explosive may so deteriorate as to fail to detonate completely, because ammonium nitrate takes up moisture readily. The redipping of cartridges of ammonium nitrate explosives aids in protecting the contents against moisture, or moist air, and the cartridges should be so stored and handled as to preserve the efficacy of the paraffin-like coating. The explosives should be obtained in a fresh condition and purchased in such quantities as will permit their prompt use. Experience at the Pittsburgh experiment station of the bureau shows that ammonium nitrate explosives will usually detonate completely after storage for six months in a well-ventilated magazine.

Class 2, hydrated explosives.—To class 2 belong all explosives in which salts containing water of crystallization are the characteristic ingredients. The explosives of this class are somewhat similar in composition to the ordinary low-grade dynamites, except that one or more salts containing water of crystallization are added to reduce the flame temperature. They are easily detonated, and most of them can be used successfully in damp working places.

Class 3, organic nitrate explosives.—To class 3 belong all the explosives in which the characteristic ingredient is an organic nitrate other than nitroglycerin. The permissible explosives now listed under class 3 are nitrostarch explosives.

Class 4, nitroglycerin explosives.—To class 4 belong all the explosives in which the characteristic ingredient is nitroglycerin. These explosives contain free water or an excess of carbon, which is added to reduce the flame temperature. A few explosives of this class contain salts, or an unusually low percentage of nitroglycerin, that reduce the strength and shattering effect of the explosives on detonation. The nitroglycerin explosives have the advantages of detonating easily and of not being readily affected by moisture.

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WEIGHT OF 1¼ BY 8 INCH CARTRIDGE.

The size in which cartridges of permissible explosives are usually sold is 1¼ by 8 inches, and from the weight of a cartridge of this size as given in the table the number of cartridges required to make the 680 grams (1½ pounds) maximum permissible quantity of explosive in a shot may be readily determined. To illustrate, the first explosive on the accompanying list (Aetna coal powder A), like all the other explosives on the list, is permissible only when fired in charges not exceeding 680 grams (1½ pounds). The maximum permissible weight shot (680 grams), divided by the weight of one 1¼ by 8 inch cartridge (184 grams of Aetna coal powder A), gives the maximum permissible number of cartridges of this size that may be used, 3⅝ (or 3.69) cartridges.

SMALLEST PERMISSIBLE DIAMETER.

In order that the user may know readily the smallest diameter in which a given explosive is permissible, this information is given in the table. Should a manufacturer desire that an explosive be approved as permissible in a smaller diameter than that in which it is now permissible, he should make application for the necessary tests.

PERCENTAGE STRENGTH AS DETERMINED BY THE BALLISTIC PENDULUM.

The figures in the seventh column of the table show the percentage strength as compared with Pittsburgh Testing Station standard 40 per cent straight nitroglycerin dynamite and not as the unit deflective charge as given in previous publications. The strength relation is therefore shown as direct and not inverse, as heretofore published. The method of making the test is described in Technical Paper 186, pages 17 and 18. The percentage strength is computed by dividing 227 by the unit deflective charge. Manufacturers, users, and others who have previously used the unit deflective charge can compute this value by dividing 227 by the figure given for the percentage strength. Many observers have expressed the opinion that the "coal-getting" strength of permissible explosives is represented better by the results of this test than by the results of any other single test yet devised. The reader should note that the results do not take into consideration whether the coal when shot down is fine or coarse.

In comparing the percentage strength of one explosive with that of another explosive a fine distinction should not be drawn, for it must be remembered that tolerance limits have been established for the results with the ballistic pendulum, as given on page 103, and these limits are designed to cover all reasonable variations of manufacture, sampling, and chemical and physical determinations made. This principle applies to all the items of the chemical analysis as well as to the items of the physical tests.

RATE OF DETONATION.

The table shows in feet per second and meters per second the relative velocity of detonation of each explosive. The adaptability of a permissible explosive to a particular coal-mining condition depends greatly on its rate of detonation. For certain work in which a shattering effect is desired, as in driving through or "brushing" rock, or in producing coal for coke making, the explosive reaction shoud be rapid, and for such work permissible explosives having a high rate of detonation should be selected. Similarly, for shooting down a soft, friable coal to produce lump or steam coal, a permissible explosive should be selected that detonates slowly and hence gives a more prolonged pressure. In medium hard coal an explosive having an intermediate rate of detonation may be expected to be most suitable.

Although these relations usually hold, they do not always, because coals differ in hardness and coal beds differ in the number and position of the joints, partings, and shale bands. Such facts have to be considered in selecting an explosive for mining coal.

An explosive having a very low rate of detonation is not always the best for mining a friable coal much fractured, because some of its energy may be lost by its gases escaping through the fractures. Under such conditions an explosive having an intermediate rate produces the most economical results.

TOLERANCES FOR PERMISSIBLE EXPLOSIVES.

The tolerances promulgated by the Bureau of Mines provide for reasonable limits of variation in the results of analyses and tests of field samples of permissible explosives. These tolerances as now existing and as stated below are quoted, except as amended November 15, 1920, from Bulletin 96, in which they were first published after having been established and made effective July 1, 1915.

In order to define more exactly what is meant by the phrase "similar in all respects" in the definition of a permissible explosive, namely, "an explosive is called a permissible explosive when it is similar in all respects to the sample that passed certain tests by the United States Bureau of Mines and when it is used in accordance with the conditions prescribed by this bureau," the following tolerances are recommended for field samples or manufacturers' samples of explosives, beyond which such lot of explosives can not vary and still be considered permissible for use in coal mines:

Chemical analysis.—Moisture, to be fixed by a sliding scale from 1½ per cent at zero to 4 per cent at 10 per cent of moisture in original sample, this tolerance being on total percentage of moisture in the explosive.

Other ingrediants (or their equivalents) in quantities not exceeding 60 per cent, according to curve shown in figure 1, except that the chemical tolerance for carbonaceous combustible material is changed to plus or minus 3 per cent regardless of the amount of carbonaceous combustible material reported as present.

For the purpose of applying the chemical tolerance, the commercial ammonium nitrate will be reported as the sum of the ammonium nitrate, the ammonium chloride and ammonium sulphate reported as present, and the tolerance applied to this figure. The sum of the ammonium chloride and ammonium sulphate will be reported separately in a note and the tolerance applied to their sum will be 4 per cent of the commercial ammonium nitrate reported as present in the basic sample. For ingredients in quantities of 60 per cent or more, the tolerance shall be plus or minus 3 per cent. *Provided,* That the ingredients of a permissible explosive shall be considered to be those substances reported as found by the Bureau of Mines in the original sample of that explosive submitted for test as to its permissibility: *And provided further,* That an equivalent shall be considered to be a substance which would not materially alter the properties of the explosive and which would produce the same result as the original substance.

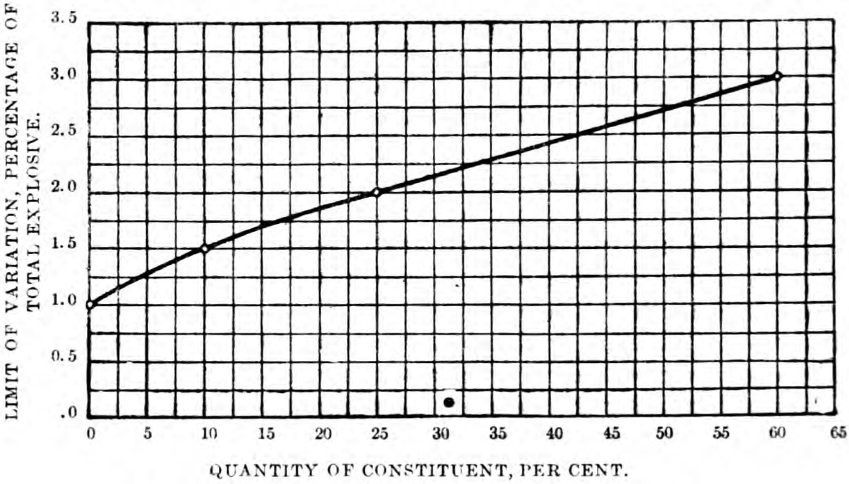

FIG. 1.—Curve of limit variation in composition of permissible explosives.

Products of combustion (determined by Bichel gage tests).—The volume of poisonous gases from 680 grams of the explosive, including its wrapper, must be less than 158 liters, except that in case the

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first test yields 158 liters or more poisonous gases per 680 grams of the explosive, including its wrapper, the average result of three tests agreeing within 5 per cent of each other shall be taken, and no explosive shall remain permissible when this average for poisonous gases exceeds the above standard limits.

Physical tests.[a]—In making rate of detonation and percentage strength tests by the ballistic pendulum, the tests stop after obtaining three results within 5 per cent, or a total of six results. All the results within 10 per cent will be averaged. If there are two or more groups in which the results are within 10 per cent of each other, then all the results which are within any group will be averaged.

The tolerances applied using the above rules are:

Rate of detonation (the average of 3 to 6 trials within 10 per cent with Mettegang Recorder) plus or minus 15 per cent.

Percentage strength determined by the ballistic pendulum as compared with the Pittsburgh Testing Station standard 40 per cent straight nitroglycerin dynamite (the average of 3 to 6 trials within 10 per cent with the ballistic pendulum), plus or minus 10 per cent.

Grams of wrapper per 100 grams of explosive, plus or minus 2.0 grams (average of four determinations): *Provided*, That the manufacturers shall submit samples of all different sizes of cartridges, to be considered as part of the original sample, the amount of wrapper to be determined for each size of sample: *And provided further*, That the tolerances as suggested shall be determined in comparison with the various diameters of samples as submitted with the original sample.

Apparent specific gravity of cartridge, by sand, plus or minus 7.5 per cent (average of four determinations): *Provided*, That actual density shall be determined on cartridges of the same diameter as the standard: *And provided further*, That manufacturers shall be required to submit samples of all sizes.

Gas and dust gallery No. 1.—No ignition must be obtained in each of one or more trials. Note: In the retesting of permissible explosives by tests 1 and 4, the charges of the explosives fired will be reduced 10 per cent in weight from the weights originally used in order to eliminate any likelihood of a failure being due to the natural variations in the gallery conditions.

Pendulum friction test.—Each explosive must pass a test of 10 trials under the same conditions as originally tested, except that the height of fall of the wood-fiber shoe will be reduced by 10 per cent in order to eliminate any likelihood of a failure being due to the natural variations in test conditions.

FIELD SAMPLES OF PERMISSIBLE EXPLOSIVES.

The bureau is now reexamining permissible explosives found in commercial shipments and in the field to determine how closely they conform to the samples upon which the permissibility tests were originally made. In order that this examination can be properly made, the tolerances as given above are applied in the manner stated below, according to the rules and regulations promulgated November 15, 1920. These methods of applying the tolerances supersede all previous methods.

In the event that a field sample of a permissible explosive exceeds the tolerance for one or more items, the bureau will take the following action:

(*a*) If the explosive exceeds the tolerance for any items of the chemical analysis, for grams of wrapper per 100 grams of explosive, for apparent specific gravity, for rate of detonation, or for unit deflective charge, the manufacturer only will be advised of the results, except that, should these results in the opinion of the explosives engineer indicate that the explosive is unsafe for use, then the operator or owner will be immediately warned, and further tests promptly inaugurated.

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[a] For method of making these tests, see Howell, S. P., and Tiffany, J. E., Methods for routine work in the explosives physical laboratory of the Bureau of Mines: Tech. Paper 186, Bureau of Mines, 1918, 63 pp.

(*b*) If the explosive exceeds the tolerance for gallery tests, pendulum friction test, or poisonous gases, the bureau will declare that particular lot of explosive not permissible, and a copy of the notification to the consumer or owner will be furnished the manufacturer, the notification to state that the explosive did not meet the requirement for gallery tests, pendulum friction test, or poisonous gases, as the case may be.

The term "Lot of permissible explosives" as used in the tolerances promulgated by the director, is defined as "all of that explosive in the magazine from which the sample is procured."

When a given lot of explosive is declared not permissible and the owner and the manufacturer notified, the bureau does not attempt to fix responsibilities between owner and manufacturer.

The usual causes of an explosive exceeding the tolerances for chemical analysis or physical tests are two: (1) It may not have been properly manufactured; (2) it may not have been properly stored. The manufacturer is responsible for (1) because the consumer has no control over the method of manufacture of the explosive, but the consumer or owner is responsible for (2) because the manufacturer has no control over the conditions of storage when the explosive has once passed from his ownership.

The manufacturer should exercise due care that the quality of the raw materials, and the weighing and incorporating of them, is similar in all respects to that for the original sample of explosives submitted for tests; and that the explosive is fresh and in first-class condition when sold. The user should store explosives in well-ventilated magazines, at temperatures not exceeding 90° F. The boxes should be placed so that the cartridges lie horizontally, though the tops of the boxes may be up or down. The explosives purchased first should be used first, and hence older explosives should not be stored under or behind a fresh consignment. It is well to purchase explosives in such quantities that they can be used promptly.

STATE MINE INSPECTORS AND OTHER MINE OFFICIALS IN THE UNITED STATES.

JANUARY 1, 1921.

Name.	Designation.	Address.
	ALABAMA.	
Charles H. Nesbitt	Chief mine inspector	421-423 Chamber of Commerce, Birmingham.
E. E. Echols	Assistant mine inspector, district No. 1	Tuscaloosa.
David Kelso	Assistant mine inspector, district No. 2	Wylam.
Jas. B. Carlin	Assistant mine inspector, district No. 3	Pratt City.
S. M. Thompson	Assistant mine inspector, district No. 4	Helena.
	Assistant mine inspector, district No. 5	
W. W. Kicker	Assistant mine inspector, district No. 6	Ensley.
	ALASKA.	
B. W. Dyer	United States mine inspector	Fairbanks.
B. D. Stewart	Territorial mine inspector	Juneau.
	ARIZONA.	
G. M. Butler	Director, State bureau of mines	Tucson.
J. F. White	State mine inspector	Phoenix.
E. F. Myers	Deputy mine inspector	Bisbee.
J. F. McManus	do	Globe.
Mathew Hall	do	Prescott.
	ARKANSAS.	
James G. Ferguson	Commissioner of mines, manufactures, and agriculture.	Little Rock.
Jess Redyard	State mine inspector	413-414 First National Bank Building, Fort Smith.
	CALIFORNIA.	
Will J. French	Chairman, industrial accident commission	525 Market Street, San Francisco.
W. P. Ratliff	Chief statistician	Do.
H. M. Wolflin	Superintendent of safety	Underwood Building, San Francisco.
G. Chester Brown	Chief mining engineer	525 Market Street, San Francisco.
J. Wesley Gebb	Mining engineer	Underwood Building, San Francisco.
F. L. Lowell	do	525 Market Street, San Francisco.
F. McN. Hamilton	State mineralogist	Ferry Building, San Francisco.
E. S. Boalich	Mining engineer, California State mining bureau.	Do.
	COLORADO.	
	Metal mines.	
Horace F. Lunt	Commissioner, bureau of mines, State of Colorado.	Denver
Hazel M. Schmoll	Secretary	Do.
T. R. Henahen	Inspector, district No. 1	Do.
M. J. McCarthy	Inspector, district No. 2	Cripple Creek.
R. J. Murray	Inspector, district No. 3	Leadville.
Robert Innes	Inspector, district No. 4	Montrose.
	Coal mines.	
James Dalrymple	Chief inspector of coal mines	State Capitol, Denver.
Henry King	Deputy inspector	Do.
James W. Graham	do	Lafayette.
W. H. James	do	Walsenberg.
W. M. Laurie	do	Trinidad.
Hugo H. Machin	do	Aguilar.
	IDAHO.	
Stewart Campbell	State mine inspector, mining department	Boise.

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State mine inspectors and other mine officials in the United States, January 1, 1921—Continued.

Name.	Designation.	Address.
	ILLINOIS.	
Robt. M. Medill	Director, department of mines and minerals	Springfield.
Martin Bolt	Assistant director	1600 South College Street, Springfield.
William Hutton	Member, State mining board	Duquoin.
Peter Joyce	do	Springfield.
M. S. Coleman	do	Harrisburg.
James Needham	do	Chicago.
William Hall	President, miners' examining board	Springfield.
William H. Turner	Member, miners' examining board	Collinsville.
John A. Tuttle	Secretary, miners' examining board	Harrisburg.
Joseph C. Viano	Member, miners' examining board	Coal City.
Richard Neeson	Mine inspector	Illinois Hotel, Springfield.
Walter A. Waite	Mine inspector, district No. 1	422 East Erie Street, Springvalley.
William E. Kidd	Mine inspector, district No. 2	603 Columbia Terrace, Peoria
Thomas P. Back	Mine inspector, district No. 3	321 West Locust Street, Canton.
Robert F. Back	Mine inspector, district No. 4	216 North English Avenue, Springfield.
Joseph Haskins	Mine inspector, district No. 5	Catlin.
John G. Millhouse	Mine inspector, district No. 6	Box 254, Litchfield.
Henry D. Thompson	Mine inspector, district No. 7	Collinsville.
Jas. R. Richards	Mine inspector, district No. 8	214 North Twelfth Street, Belleville.
Frank Rosbottom	Mine inspector, district No. 9	Duquoin.
John O'Rourke	Mine inspector, district No. 10	Mine rescue station, Benton.
Thos. English	Mine inspector, district No. 11	Springfield.
W. L. Morgan	Mine inspector, district No. 12	Marion.
Jas. Taylor	Special mining investigator	517 Bigelow Street, Peoria.
	INDIANA.	
Samuel R. Artman	Chairman, industrial board of Indiana	Room 122, State Capitol, Indianapolis.
Cairy Littlejohn	Chief mine inspector	Room 102, State Capitol, Indianapolis.
John Ellison	Deputy mine inspector	Winslow.
Albert C. Dally	do	Knightsville.
Samuel J. Wilton	do	Carbon.
John Stevely	do	Clinton.
Thos. Gillespie	do	Bicknell.
	IOWA.	
E. M. Gray	President, Iowa State mining board	Des Moines.
W. H. Weir	Secretary, Iowa State mining board	Do.
W. E. Holland	Inspector, district No. 1	Albia.
R. T. Rhys	Inspector, district No. 2	Ottumwa.
Edward Sweeney	Inspector, district No. 3	Des Moines.
	KANSAS.	
J. H. Crawford	Commissioner of labor and industry	Topeka.
James Sherwood	Assistant commissioner in charge of mine inspection department.	Pittsburg.
William Glennon	Deputy mine inspector	Do.
Peter H. White	do	Daisy Hill.
Martin Kotzman	do	Frontenac.
Matt Dunn	do	Burlingame.
John Gilday	do	Frontenac.
C. E. Perkins	Clerk	Pittsburg.
P. E. Keegan	Stenographer	Do.
	MINE RESCUE DEPARTMENT.	
James Sherwood	Ex-officio superintendent rescue stations	Pittsburg.
Geo. B. Dinneen	Superintendent Central mine rescue station	Do.
William Hislop	Superintendent Arma mine rescue station	Arma.
George Farromond	Superintendent Scammon mine rescue station	Scammon.
	KENTUCKY.	
L. Blenkinsopp	Chief inspector of mines	Lexington.
William Roberts	Assistant inspector of mines, district No. 1	Madisonville
W. H. Hunt	Assistant insepctor of mines, district No. 2	Central City
Joseph A. Lewis	Assistant inspector of mines, district No. 3	Lexington.
R. D. Collett	Assistant inspector of mines, district No. 4	Pineville.
Lacey Laxton	Assistant inspector of mines, district No. 5	Harlan.
H. C. Faulkner	Assistant inspector of mines, district No. 6	Hazard.
M. L. Wells	Assistant inspector of mines, district No. 7	Paintsville.
Grant Phillips	Assistant inspector of mines, district No. 8	Pikeville.

State mine inspectors and other mine officials in the United States, January 1, 1921—Continued.

Name.	Designation.	Address.
	MARYLAND.	
Frank Powers	State mine inspector	Frostburg.
	MICHIGAN.	
Richard H. Fletcher	Commissioner, department of labor	Lansing.
Maurice D. Kirby	Chief clerk, department of labor	Do.
Perry J. Ward	Deputy commissioner, department of labor	Do.
Arthur K. Smith	Coal-mine inspector	613 North Sherman Street, Bay City.
John C. Clemens	Mine inspector for Gogebic County	Bessemer.
Swan Olson	Deputy mine inspector for Gogebic County	Do.
Mat Salo	do	Ironwood.
John Brickman	Mine inspector for Keweenaw County	Ahmeek.
Gust. Kei[illegible]kala	Deputy mine inspector for Keweenaw County	Mohawk.
Alfred James	Mine inspector for Houghton County	Laurium.
John Allaria	Deputy mine inspector for Houghton County	Calumet.
Harry J. King	do	Laurium.
Michael Pakkala	do	Atlantic Mine.
Fred Mitchell	Mine inspector for Iron County	Iron River.
James H. Yelland	Mine inspector for Marquette County	Ishpeming.
Frank L. Larson	Mine inspector for Dickinson County	Iron Mountain.
Robt. Eva, sr	Mine inspector for Ontonagon County	Greenland.
John P. Christopher	Mine inspector for Baraga County	602 Pine Street, Marquette.
	MINNESOTA.	
John P. Gardiner	Commissioner of labor and industries	St. Paul.
Oscar M. Sullivan	Chief statistician of labor and industries	Do.
Ed. Smith	Mine inspector for St. Louis County	Eveleth.
W. J. Trescott	Mine inspector for Itasca County	Coleraine.
August Swanson	Mine inspector for Crow Wing County	Brainerd.
F. A. Wildes	Chief inspector of mines, State and school lands	Hibbing.
	MISSOURI.	
George Hill	Chief mine inspector	Bevier.
Joseph Goldman	Secretary, State bureau of mines and mining	Jefferson City.
Ruth Scherer	Stenographer	Do.
C. C. Keith	Inspector of lead and zinc mines	Joplin.
R. C. Detchmendy	do	Flat River.
C. M. Harlan	do	Carterville.
J. A. Galbraith	do	Webb City.
Evan Jones	Inspector of coal mines	Higbee.
W. P. Craven	do	Camden.
	MONTANA.	
A. E. Spriggs	Chairman, State industrial accident board	Helena.
George N. Griffin	State coal-mine inspector	Do.
W. B. Orem	State metal-mine inspector	Do.
	NEVADA.	
George D. Smith	Chairman, Nevada industrial commission	Carson City.
A. J. Stinson	State mine inspector	Do.
Charles Huber	Deputy mine inspector	Tonopah.
Alex. Baird	do	Ely.
	NEW JERSEY.	
John Roach	Chief, bureau of mines, department of labor	State House, Trenton.
Augustus Munson	State mine inspector	P. O. Box 311, Dover.
	NEW MEXICO.	
W. W. Risdon	State inspector of mines	Gallup
	NEW YORK.	
Edward F. Boyle	Chairman, State industrial commission	124 East Twenty-eighth Street, New York.
E. B. Patton	Chief statistician, State industrial commission	Albany.
W. W. Jones	Mine inspector, State industrial commission	Do.
Robert W. Jones	Inspector of mines and tunnels, State industrial commission.	124 East Twenty-eighth Street, New York.
Gustav Werner	Tunnel inspector, State industrial commission	Do.
	NORTH CAROLINA.	
M. L. Shipman	Commissioner of labor and printing	Raleigh.

State mine inspectors and other mine officials in the United States, January 1, 1921—Continued.

Name.	Designation.	Address.
	NORTH DAKOTA.	
W. H. Robinson	State engineer	Bismarck.
J. M. Hanson	Assistant State engineer	Do.
John Hanwell	State mine inspector	P. O. Box 271, Bismarck.
	OHIO.	
Thos. J. Duffy	Chairman, industrial commission of Ohio	Columbus.
Jerome Watson	Chief deputy inspector of mines, Industrial Commission of Ohio.	Do.
Miss Hazel Sims	Chief clerk, division of mines, Industrial Commission of Ohio.	Do.
Dan C. Jones	Deputy mine inspector	Coalton.
Jas. Dugan	do	Murray.
Andrew Ginnan	do	Jacksonville.
Elmer Sagle	do	Roseville.
E. W. Smith	do	Byesville.
Stephen Williams	do	Barnhill.
Lot Jenkins	do	Martins Ferry.
Frank P. Corey	do	Flushing.
Thomas P. Williams	do	Belmont.
Thos. G. Reese	do	Salem.
George H. Foster	do	Massillon.
Andrew Mullen	do	Amsterdam.
Percy W. Moore	Rescue car attendant	Columbus.
J. C. Wilson	Oil and gas well inspector	Do.
	OKLAHOMA.	
Ed. Boyle	Chief mine inspector (mines, oil, and gas)	McAlester.
John O'Brien	Assistant mine inspector. district No. 1	Lehigh.
A. E. Nichols	Assistant mine inspector, district No. 2	Haileyville.
Miller D. Hay	Assistant mine inspector, district No. 3	East Broadway Apartments, Muskogee.
	OREGON.	
J. W. Ferguson	Chairman, State industrial accident commission.	Salem.
Henry M. Parks	Director, Oregon bureau of mines and geology	417 Oregon Building, Portland.
	PENNSYLVANIA.	
Seward E. Button	Chief, department of mines	Harrisburg.
Frank Hall	Deputy, department of mines	Do.
Edward C. Malick	Chief clerk, department of mines	Do.
	Anthracite inspectors.	
Benjamin Maxey	Mine inspector, 1st district	Forest City.
P. J. Moore	Mine inspector, 2d district	Carbondale.
L. M. Evans	Mine inspector, 3d district	Scranton.
Jenkin T. Reese	Mine inspector, 4th district	Do.
S. J. Phillips	Mine inspector, 5th district	Do.
David T. Williams	Mine inspector, 6th district	Do.
Augustus McDade	Mine inspector, 7th district	263 North Main Street, Taylor.
Robert Johnson	Mine inspector, 8th district	Pittston.
Edwin C. Curtis	Mine inspector, 9th district	West Pittston.
John B. Corgan	Mine inspector, 10th district	Kingston.
T. J. Williams	Mine inspector, 11th district	Do.
D. T. Davis	Mine inspector, 12th district	Wilkes-Barre.
Frank Kettle	Mine inspector, 13th district	Nanticoke.
Joseph J. Walsh	Mine inspector, 14th district	Do.
David J. Roderick	Mine inspector, 15th district	Hazleton.
J. J. Stickler	Mine inspector, 16th district	Do.
Isaac M. Davies	Mine inspector, 17th district	Lansford.
E. G. Evans	Mine inspector, 18th district	Coaldale.
M. J. Brennan	Mine inspector, 19th district	Pottsville.
P. C. Fenton	Mine inspector, 20th district	Mahanoy City.
A. B. Lamb	Mine inspector, 21st district	Shenandoah.
William Reid	Mine inspector, 22d district	Centralia.
B. I. Evans	Mine inspector, 23d district	Mount Carmel.
P. J. Friel	Mine inspector, 24th district	Shamokin.
Charles J. Price	Mine inspector 25th district	Lykens.
	Bituminous inspectors.	
Alexander McCanch	Mine inspector, 1st district	Monongahela.
C. B. Ross	Mine inspector, 2d district	Latrobe.
Thomas K. Adams	Mine inspector, 3d district	Mercer.
William Langan	Mine inspector, 4th district	Dubois.

State mine inspectors and other mine officials in the United States, January 1, 1921—Continued.

Name.	Designation.	Address.
	PENNSYLVANIA—continued.	
	Bituminous inspectors—Continued.	
Richard Maize	Mine inspector, 5th district	Uniontown.
Thomas D. Williams	Mine inspector, 6th district	Johnstown.
Charles P. McGregor	Mine inspector, 7th district	Crafton.
Joseph Knapper	Mine inspector, 8th district	Philipsburg.
Silas S. Hall	Mine inspector, 9th district	Connellsville.
Joseph Williams	Mine inspector, 10th district	Altoona.
J. J. McDonald	Mine inspector, 11th district	Greensburg.
T. J. Lewis	Mine inspector, 12th district	Punxsutawney.
J. I. Thomas	Mine inspector, 13th district	Johnstown.
David Young	Mine inspector, 14th district	Freeport.
Alexander Monteith	Mine inspector, 15th district	Patton.
W. H. Howarth	Mine inspector, 16th district	Brownsville.
John I. Pratt	Mine inspector, 17th district	5494 Hays Street, Pittsburgh.
Thomas A Mather	Mine inspector, 18th district	Tyrone.
James J. Stoker	Mine inspector 19th district	Irwin.
F. W Cunningham	Mine inspector, 20th district	Somerset.
C. P. Byrne	Mine inspector, 21st district	Charleroi.
John F. Bell	Mine inspector, 22d district	Dravosburg.
Edward E. Girod	Mine inspector, 23d district	Masontown.
Nicholas Evans	Mine inspector, 24th district	Johnstown.
Thomas S. Lowther	Mine inspector, 25th district	Indiana.
P. J. Callaghan	Mine inspector, 26th district	Bridgeville.
Harry Phythyon	Mine inspector, 27th district	Belle Vernon.
Thomas H. Thompson	Mine inspector, 28th district	Punxsutawney.
Patrick S. King	Mine inspector, 29th district	612 North Canal Street, Pittsburgh.
C. H. Crocker	Mine inspector, 30th district	Johnstown.
	SOUTH DAKOTA.	
Otto Ellerman	State mine inspector	Lead.
	TENNESSEE.	
O. P. Pile	Chief mine inspector	Nashville.
R. D. Field	Eastern division	Knoxville.
A. J. Holden	Middle division	Dayton.
G. B. Thom	Western division	Palmer.
	TEXAS.	
B. S. Gentry	State mine inspector	Post Office Box 327, Rockdale.
	UTAH.	
Preston A. Thatcher	Chairman, industrial commission of Utah	State Capitol, Salt Lake City.
C. A. Allen	Mining engineer, U. S. bureau of mines, Chief mine inspector for the industrial commission.	Do.
John Crawford	Coal mine inspector	Do.
Wm. E. Harrison	Metal mine inspector	Do.
	VIRGINIA.	
John Hirschberg	Commissioner, bureau of labor and industrial statistics.	Richmond.
A. G. Lucas	State inspector of mines, bureau of labor and industrial statistics.	Do.
	WASHINGTON.	
James Bagley	State mine inspector	1223 Alaska Building, Seattle.
Geo. T. Wake	Deputy mine inspector	Do.
John Parker	do	Do.
	WEST VIRGINIA.	
R. M. Lambie	Chief, department of mines	Charleston.
S. E. Hawshaw	Mine inspector, 1st district	Thomas.
W. H. Sandridge	Mine inspector, 2d district	Grafton.
Evan L. Griffiths	Mine inspector, 3d district	Clarksburg.
James Golden	Mine inspector, 4th district	Morgantown.
W. B. Riggleman	Mine inspector, 5th district	Fairmont.
M. B. Coulter	Mine inspector, 6th district	Moundsville.
Eli J. Mason	Mine inspector, 7th district	Charleston.
M. E. Quenon	Mine inspector, 8th district	Do.

State mine inspectors and other mine officials in the United States, January 1, 1921—Continued.

Name.	Designation.	Address.
	WEST VIRGINIA—continued.	
Zach Evans	Mine inspector, 9th district	Handley.
L. B. Holliday	Mine inspector, 10th district	Whitesville.
Wm. M. Chapman	Mine inspector, 11th district	Smithers.
A. P. Burdiss	Mine inspector, 12th district	Thurmond.
Robert Lilly	Mine inspector, 13th district	Mt. Hope.
V. E. Sullivan	Mine inspector, 14th district	Beckley.
Thomas Stockdale	Mine inspector, 15th district	Bramwell.
Pete McLinden	Mine inspector, 16th district	Welch.
J. W. P. St. Clair	Mine inspector, 17th district	Williamson.
W. D. Lee	Mine inspector, 18th district	Iaeger.
J. F. White	Mine inspector, 19th district	Logan.
H. M. Black	Director mine rescue	Charleston.
S. A. Westenhaver	Sand mine inspector	Martinsburg.
	WISCONSIN.	
R. McA. Keown	Engineer, industrial commission	Madison.
Arthur H. Findeisen	Mine inspector, industrial commission	Do.
	WYOMING.	
R. T. Sneddon	Coal-mine inspector, district No. 1	Diamondville.
R. V. Hotchkiss	Coal-mine inspector, district No. 2	Sheridan.

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